Model Engineer

THE MAGAZINE FOR THE MECHANICALLY MINDED

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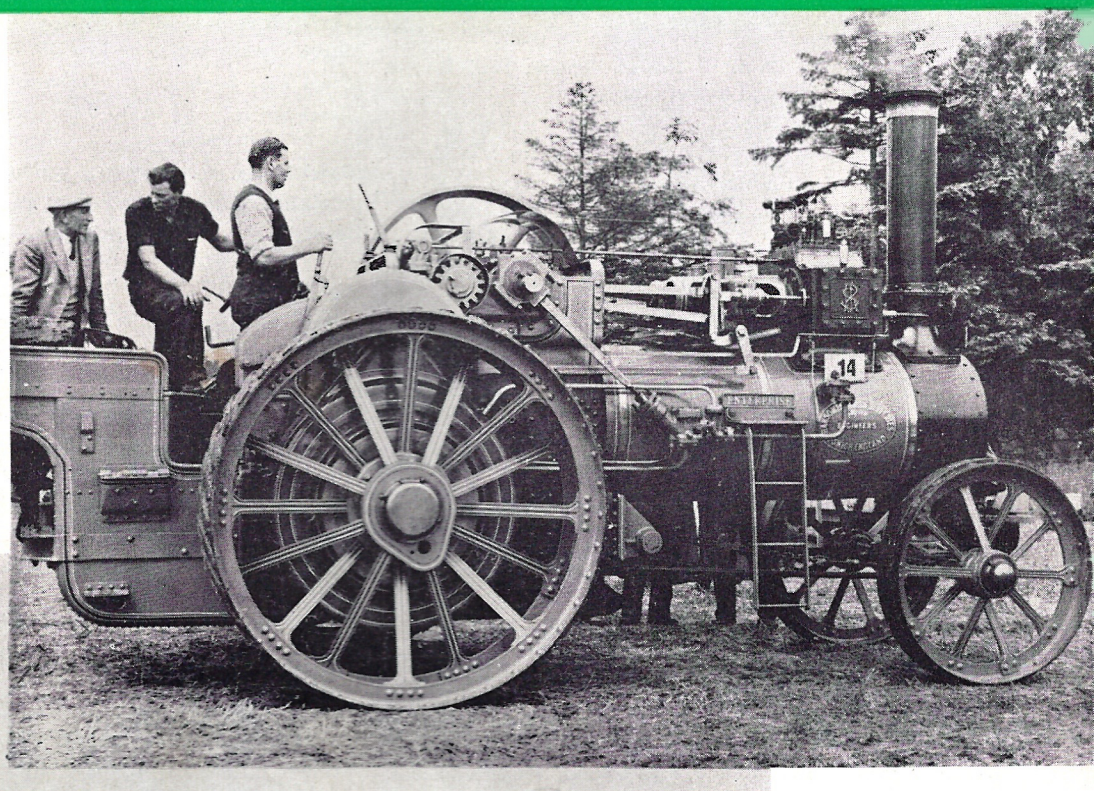

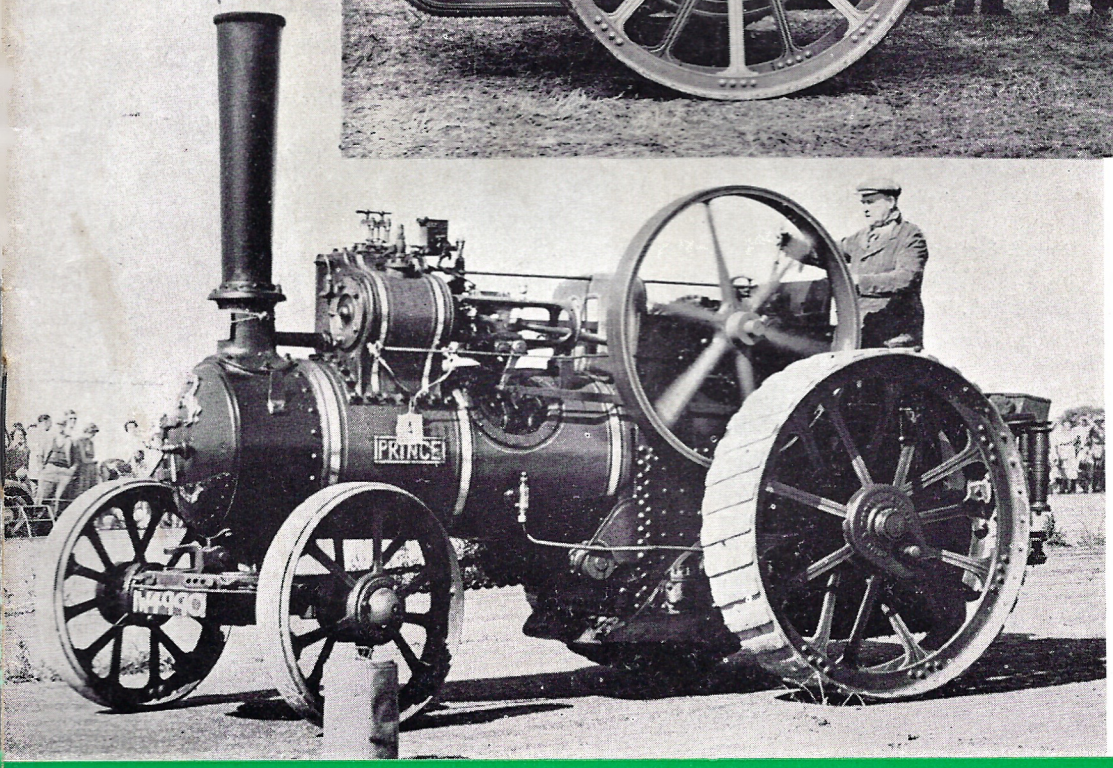

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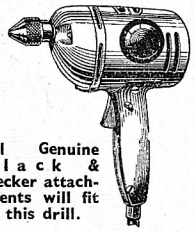

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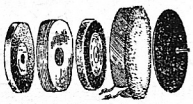

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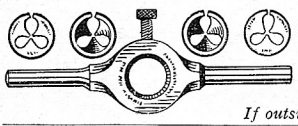

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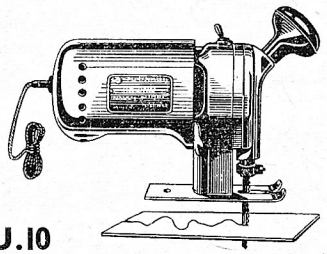

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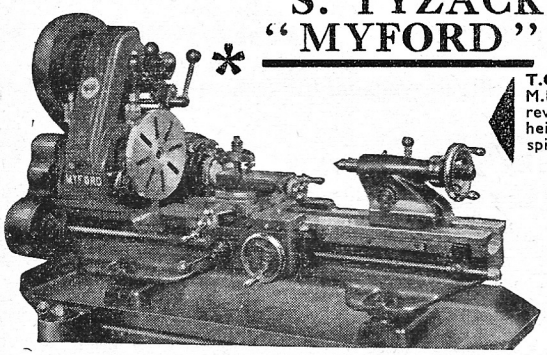

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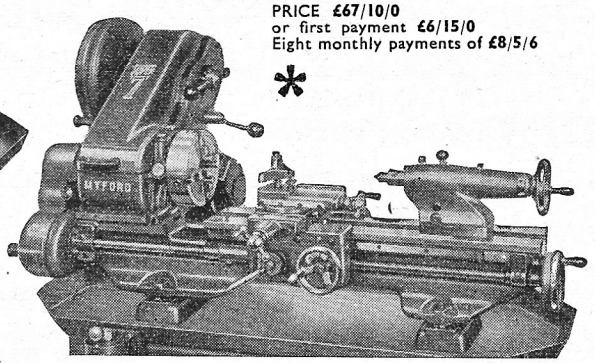

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COVER PICTURE

Top: Ransomes traction engine No 38088, of 8 n.h.p., built in 1927 and below Aveling and Porter 6 n.h.p. of 1903 vintage. A. R. Dibben writes of traction engines on pages 305 to 307.

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A WEEKLY COMMENTARY

Smoke Rings

By VULCAN

THE British Transport Commission museum at Clapham is now slowly settling into a pattern under the astute direction of Dr John H. Scholes.

Not all of the exhibits will be of full size vehicles, some will be models, yet another testimony to the value of the fascinating hobby of model engineering.

I have just heard from Mr F. J. Roche, well known for his exquisite models of tramcars, that two of his prize-winners have been accepted for display at the museum.

They are models of a London County Council tram and a Glasgow Corporation car, both of which have won senior awards at Model Engineer Exhibitions. The LCC tram won for Mr Roche a silver medal and the Glasgow tram was awarded a bronze.

I am delighted to hear this news. I have always held these two models in high esteem and I am sure it must gratify their builder that they have won this added distinction.

Model cars

ANYONE in the Ipswich area who is interested in model car construction might well profit by contacting Mr J. M. R. Thurston at 280 Colchester Road, Ipswich.

Mr Thurston is the model car section leader of the Ipswich Model Engineering Society and he tells me that the club has a somewhat neglected diesel car track but several members are anxious to construct an electric car track, either slot or rail, but more support must be forthcoming before this can materialise.

Though the diesel section is not very well supported, excellent racing has been held. A little more support would be a tremendous fillip.

Wide activities

The activities of the society cover a wide field. It possesses 3½ in. and 5 in. gauge model locomotive tracks, a well equipped workshop which is available to every member, and model boat section which is affiliated to the Model Power Boat Association.

Apart from the club's desire to improve their model car section they would also welcome new members to their live-steam and model boat sections.

Meetings are held in the club house at 547 Foxhall Road, Ipswich on Tuesday evenings at 7.30.

Passenger ships

THE modern passenger liner is often described as a floating hotel, but so far its conception seems to be based on the railway train, with its different passenger classes, than on the hotel plan.

The new Union-Castle liner, *Transvaal Castle*, now being built on the Clyde by John Brown and Co., will be the first real "hotel class" ship. The idea of tourist class, cabin class, and first class, with reserved decks and verandahs, will be done away with, and passengers will have the run of the ship, being able to select from a wide choice the accommodation they desire, according to the fare they wish to pay.

There will be single rooms, double rooms, two, three and four berth cabins, as well as de luxe rooms and suites with appropriate furnishings. In addition there will be a large range of public rooms, including a dining room to seat over 400, observation verandahs and cafes, and a well equipped cinema.

Floating Community

The passengers will form a complete community, using the ship and its facilities as people ashore use a first-class hotel. The amenities of the ship will be freely available to every passenger, irrespective of the type of accommodation occupied. This arrangement should be eminently suitable for the Cape run, where the time spent on the ship is considerably longer than on a trans-Atlantic passage.

The *Transvaal Castle* is a big ship, having an overall length of 756 ft moulded breadth 90ft, draught 32 ft and a tonnage of 33,000. Her hull form has been carefully designed, she has a bulbous bow, and is fitted with Denny-Brown stabilisers.

The steam turbines are of Pametrada design, driving twin screws, and will develop 40,000 s.h.p.

Both ship and engines are being built at Clydebank, and it is expected she will be ready to take her place in

the Union-Castle Line's South African Mail Service in January 1962. She will carry about 740 passengers, and have a crew of 426.

Posthumous series

WHEN Mr J. N. Maskelyne died his popular series, "Locomotives I Have Known," was temporarily displaced by his other articles on "Locomotive Details in Miniature."

But he did not neglect the other series, for he had prepared more than a dozen articles in readiness for its return. Arrangements have now been made for their publication and the first of this posthumous "Locomotives I Have Known" appears in this issue.

Some of Mr Maskelyne's drawings are incomplete, but rather than deprive the enthusiast of an article from a well-loved writer it has been decided to publish the unfinished drawings.

These are relatively few and will appear towards the end of the series. It is hoped that about 15 articles will be usable.

Boating ponds

IS there a serious shortage of boating ponds in Britain? Mr J. B. Hopkins, of Erith, Kent, believes there is.

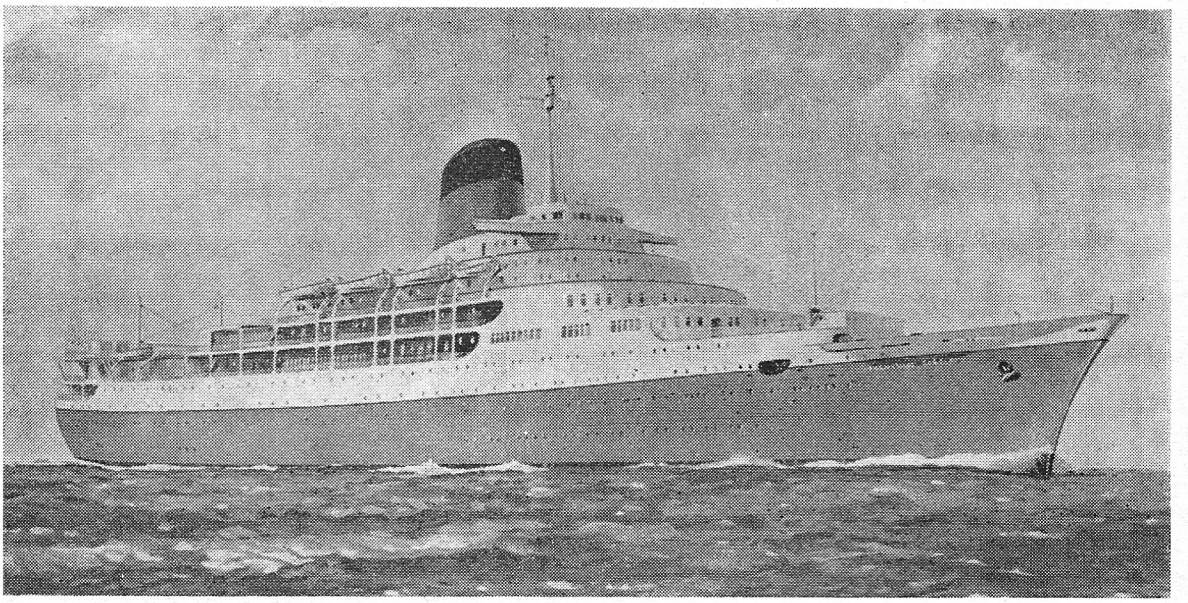
He thinks that every town of a reasonable size should have a pond. Local authorities only consider building a pond where there is a park or recreation ground, he says.

I assume there are difficulties in building ponds in other locations, and certain hazards may present themselves. Danger could arise to pedestrians in case of fog. How many people, I wonder, have got their feet wet in the famous Whitestone Pond, on top of Hampstead Heath, on misty nights?

However, a low parapet would easily solve that problem.

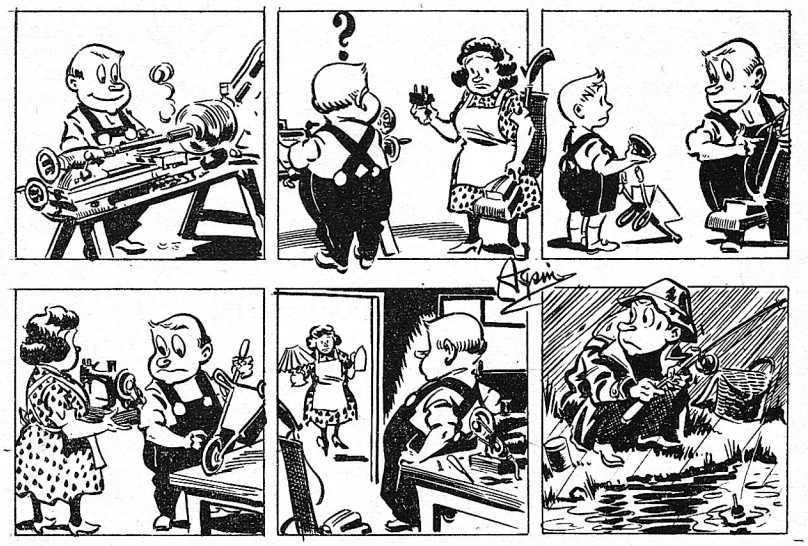
Next week

The issue for March 16 will contain another four-page instalment in the constructional series of ROB ROY. *The 3½ in. gauge 0-6-0 tank which is the subject of the grand new* MODEL ENGINEER *competition.*



How an artist foresees TRANSVAAL CASTLE *on her maiden run to the Cape*

CHUCK . . . **. . . THE MUDDLE ENGINEER**



 Continued from 23 February 1961, pages 221, 222 and 223

WHEN THE SWITCH IS MADE

N. F. HALLOWS explains how he calibrated the micro-ammeter

My small switch is built up on a $\frac{3}{16}$ in. Perspex base. The two uprights carrying the spring contacts and the pair forming the bearings for the spring-loaded plunger are best made by marking them out in line on a strip of $\frac{1}{2}$ in. × $\frac{1}{16}$ in. brass.

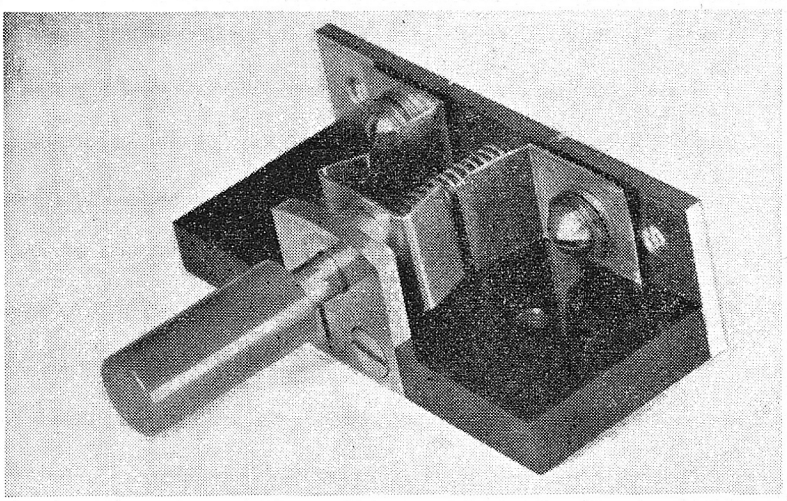
After the various drilling and tapping operations have been carried out as in the drawing, the front bearing piece is sawn off as it is mounted separately on the base. The strip, consisting of the three remaining parts with the rear bearing-upright in the centre, is then held in position on the base with six 8 BA countersunk screws. After removal, it is divided into its individual parts with a hack-saw. The opposite bearing piece is then lined up and fixed in place to lie flush with the edge of the base.

The switch plunger is made from a length of $\frac{1}{8}$ in. dia. brass rod, shouldered down to 3/32 in. to form a seating for the spring contact piece. At its outer end the rod is threaded 5 BA for the attachment of the press-button.

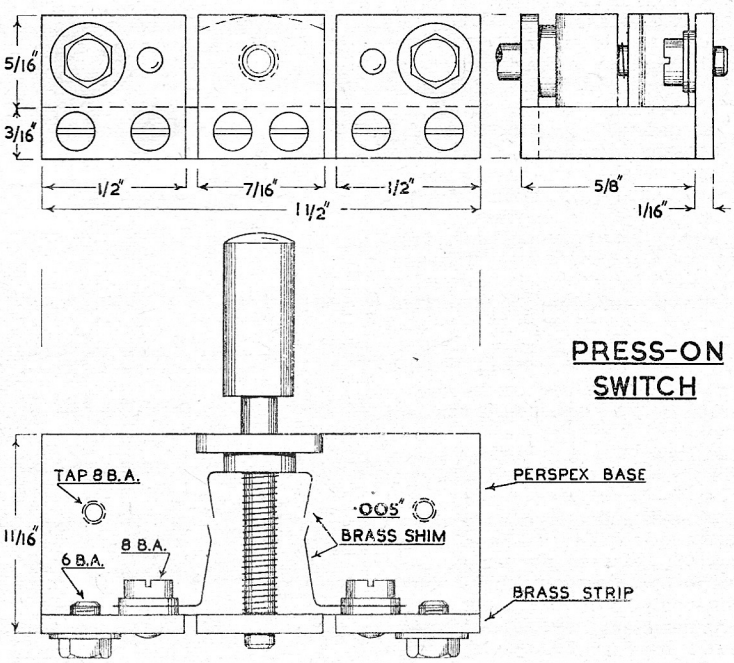
To limit the outward travel of the plunger, by the action of the light compression spring, a loose collar is fitted to the spindle. The two contact pieces for the switch are made from shim brass, bent to shape to provide rubbing contact when the plunger is depressed. The moving contact is sweated to the plunger, and the two fixed spring contacts are mounted between brass washers to keep them clear of the central bearing upright.

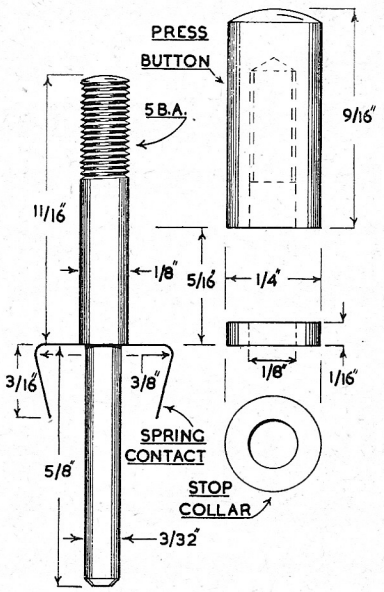
For the wiring connections to the switch, 6 BA terminal screws are fitted to the two outer uprights. The finished switch should work smoothly with only light finger pressure; the rubbing movement between the leaf springs ensures that good electrical contact is maintained.

Fix switch to the base of the container, and drill a hole in one side to allow the press-button to project for $\frac{1}{4}$ in. For connecting the meter to the two plugs attached to the twin flex of the photo-cell, two corresponding sockets are fitted to the end face of the meter container; they

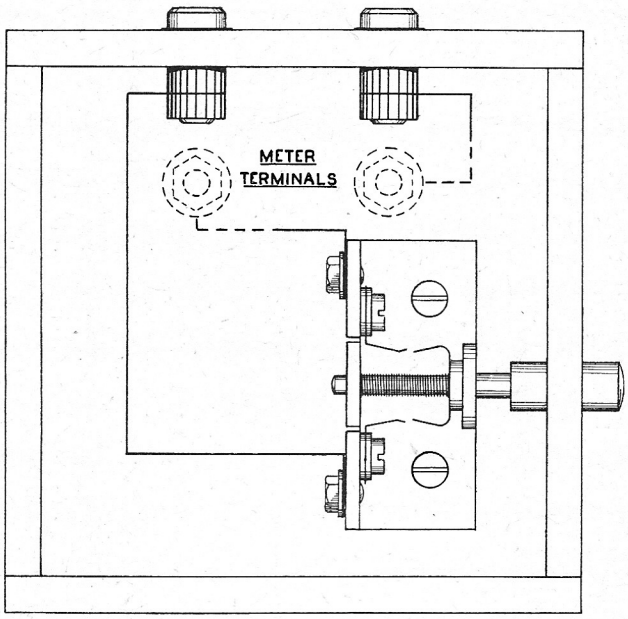


Meter circuit switch





SWITCH PLUNGER PARTS



METER WIRING CONNECTIONS

have red and black discs under their heads to indicate the polarity. On their inner ends they are furnished with knurled securing and binding nuts for attaching the wiring. The connections to the micro-ammeter should be made with light twin flex to facilitate assembly.

Plug in the photo-cell head, open the front slide, and turn the head partly towards the light. When the switch button is pressed, the meter should give a low reading on the scale and, as the head is turned further towards the light, the needle should rise accordingly, showing that the assembly is in order and that the connections have been correctly made.

I calibrated the micro-ammeter against a Weston exposure meter which had been previously used to record the exposure times for reflected light found by trial to be correct in the following conditions: lens aperture f/45, camera distance 18 in., and emulsion speed of plate 50 Weston. From these earlier recordings, the equivalent light values for the micro-ammeter were determined experimentally.

The standard meter and the meter under test were placed at a distance of 1 ft in front of a white paper background, and the intensity of the reflected light was varied by adjusting a window curtain to give the required series of readings on the Weston meter, and so their equivalent values on the micro-ammeter. I adopted the distance of 1 ft to ensure that the acceptance angle of the new meter was fully covered by the screen, thus giving maximum sensitivity. Here are the results:

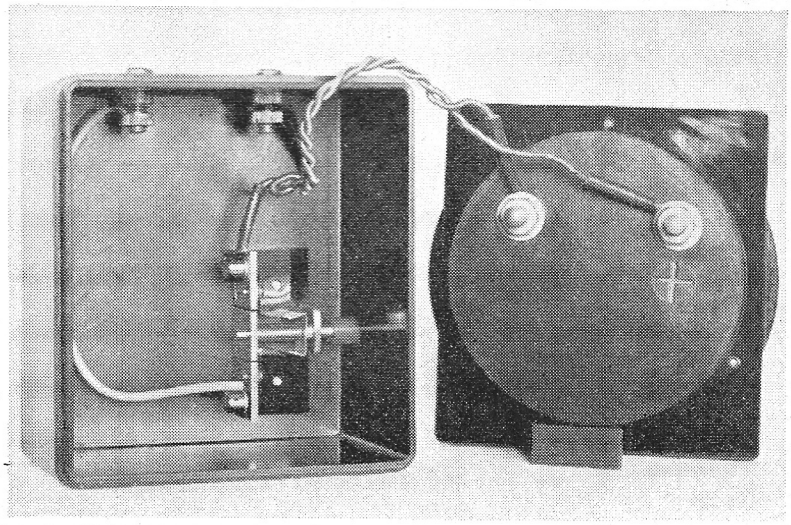
Weston Meter	*Exp. Time*	*Micro-ammeter*
4	120 sec.	70
6	90 ,,	90
8	60 ,,	120
12	45 ,,	150

These experimental findings enabled a conversion scale to be made and attached to the micro-ammeter:

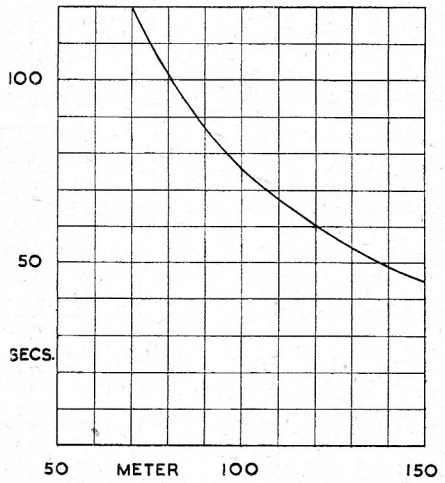
Meter ..	70	90	120	150
Min. ..	2	1½	1	¾

The scale was sufficient to cover the range of daylight intensity of practical use in the workshop.

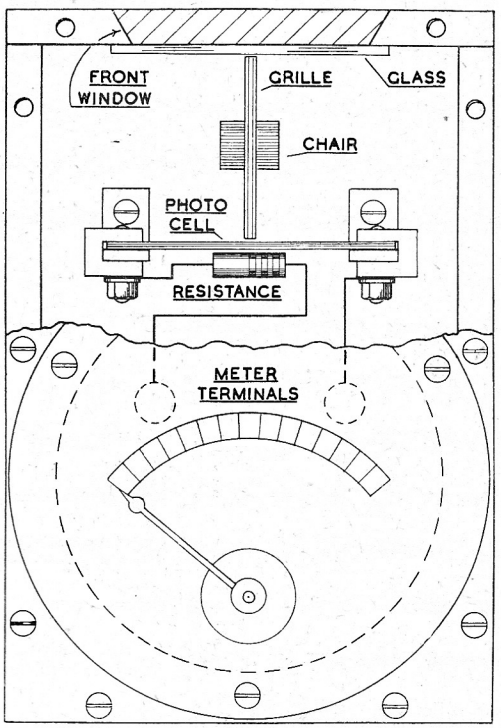
I have generally used a lens aperture of f/45 for close-up work to get the required depth of field; but, where f/32 is found to be adequate to give overall sharpness, the exposure times shown in the scale must be halved.



Interior showing the wiring connections



EXPOSURE TIME GRAPH



UNIT EXPOSURE METER

Similarly, the exposure time is successively halved for the continuing series of stops: f/22, f/16, f/11, f/8.

In photographing at short distances, one further factor must be taken into account: the distance of the camera from the object. A camera distance of 18 in. has been specified as a basis, as this has been found to be most commonly used in photographing mechanical subjects half-size with a lens of 6 in. focal length.

Adjusted to focus distant objects, a lens of 6 in. focal length will be 6 in. distant from the focusing screen, but an object photographed full-size will be 12 in. from the camera, and the lens 12 in. from the screen.

As the intensity of the illumination falling on the plate varies inversely with the square of its distance from the lens, the ratio becomes as 36 to 144 in the above circumstances. Four times the normal exposure will be needed for the nearer object.

If exposure times are based on a camera 18 in. from the object, the indicated exposure will have to be multiplied by the following approximate correction factors to give negatives of uniform density:

Distance	*Correction factor*
12 in.	× 2
15 ,,	× 1¼
18 ,,	× 1
24 ,,	× 4/5
36 ,,	× 3/5

I have said, if an object is photographed against a dark or black background, a white background must be temporarily substituted for determining by the meter the actual exposure time required.

It should be taken into account that the figures are to some extent approximations. Nevertheless, modern photographic emulsions have such a wide latitude that some departure from the theoretically correct exposure will hardly affect the density of the negative or its suitability for reproduction.

While the meter is essentially of the same basic construction as the preceding type, modifications have been introduced to make it more portable and suitable for outdoor and general use. A 2 in. dia. micro-ammeter is fitted and the photo cell is included in the same plastic case.

In integrating exposure meters of this kind it is essential to limit the light acceptance angle to that of the camera lens; or brightly-lit areas may be included in the meter's view that are not covered by the lens and a false reading of the overall subject brightness will be obtained. The meter's acceptance angle is, therefore, made not greater than 55 deg.

The cut-off is obtained by fitting a grille in front of the photo-cell. As shown in the drawing, the grille may consist of one or more elements. A piece of black card is suitable when cemented into a small plastic chair that is, in turn, attached to the floor of the container. It will be noted that, as the number of the grille elements is increased, the nearer to the front of the container the photo-cell lies. By this means, the instrument can be made more compact.

Although the grille cuts off the incident light in the horizontal plane, reception in the vertical direction is unaffected. Because of this, the meter should be pointed somewhat downwards in outdoor work to avoid a false reading from the inclusion of too much bright sky.

★ *To be continued on March* 23

TRAFALGAR SMOKE

With guns speaking, Nelson's VICTORY goes into battle . . . at a London staff party. The Editor reports from the fray

PITCHING and tossing, guns blasting, smoke pouring with each broadside, HMS *Victory* battles on through a sea of green velvet.

Such is the remarkable model which Peter Scott, advertising manager of Gallaher Ltd, the cigarette manufacturers, devised and built for a staff party in London. Nelson's *Victory* was chosen as a link-up with Nelson cigarettes.

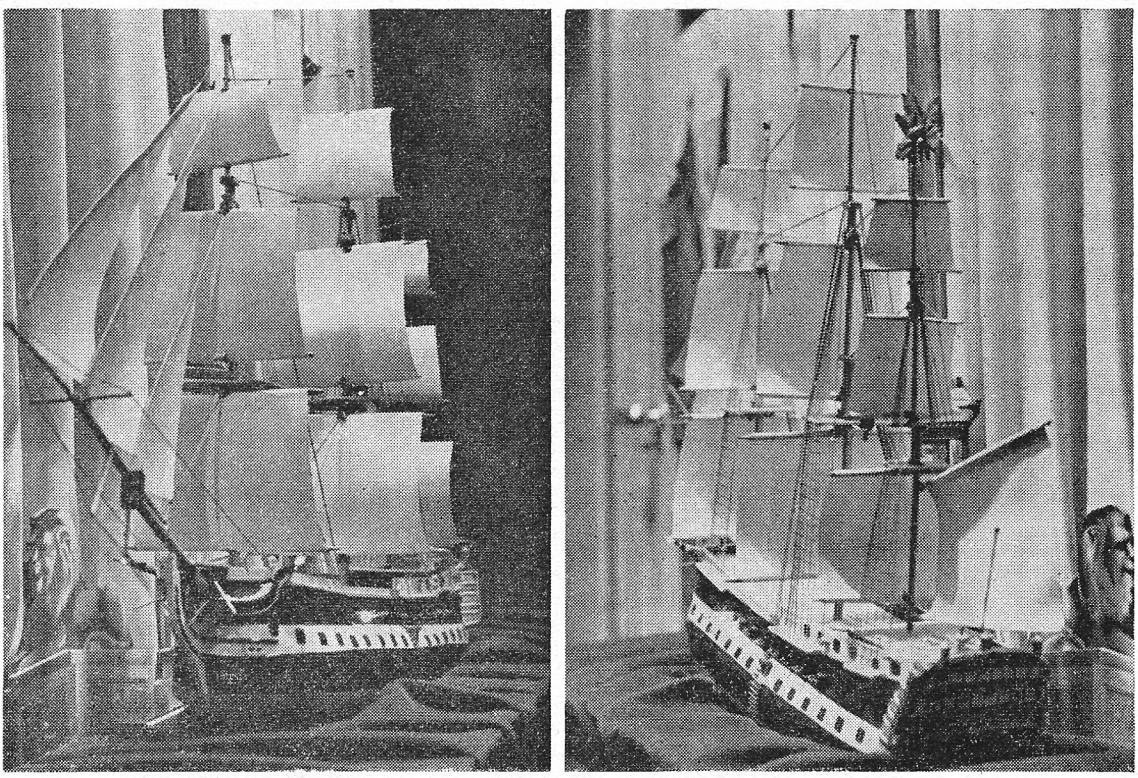
What Mr Scott set out to achieve was a simplified eight-gun model which would emulate the historic flagship by "firing" its cannon "in a predetermined sequence but not necessarily in the order of one to eight."

To create atmosphere he designed a centre ceiling fitting of swooping seagulls—complete with sound effects —which rotated gaily above the diners' heads.

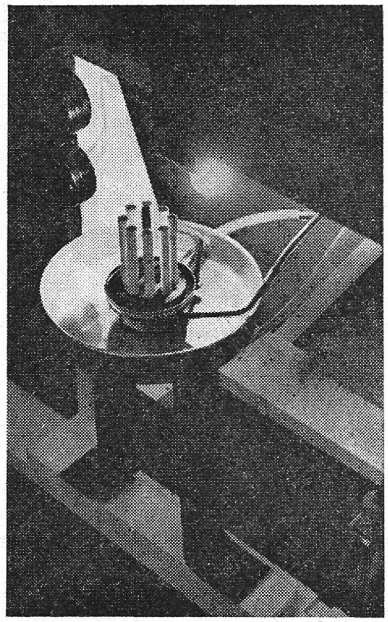
The work involved a great deal of research and experiment. With the ship two big problems had to be solved—the synchronisation of the guns' flash, smoke and boom, and the production of sufficient smoke which, for obvious reasons, had to be tobacco smoke.

Gun flashes are simulated by winking pea bulbs of pink, orange and white, to give the effect of varying gun power; the smoke is provided by eight Nelson cigarettes held in a large holder; and the crack of the cannon is produced by a beater hitting the side of a ply box, in which a hole has been shaped to give exactly the right note.

To provide the draught, Mr Scott installed two small compressors which pump air into a glass chamber



Mr Scott's model of HMS VICTORY *rides the velvet waves*



Eight Nelsons stand stiffly to attention on the outsize holder

enclosing the cigarettes. The smoke collected in the chamber is transferred by pipeline to a distributing disc worked by a ratchet and pawl.

Face to face with the driven disc is one from which radiate eight pipelines supplying smoke to each cannon. When a slit in the driven disc comes opposite a pipe hole in the stationary disc, a puff of smoke is discharged through that pipe to the relevant gun port.

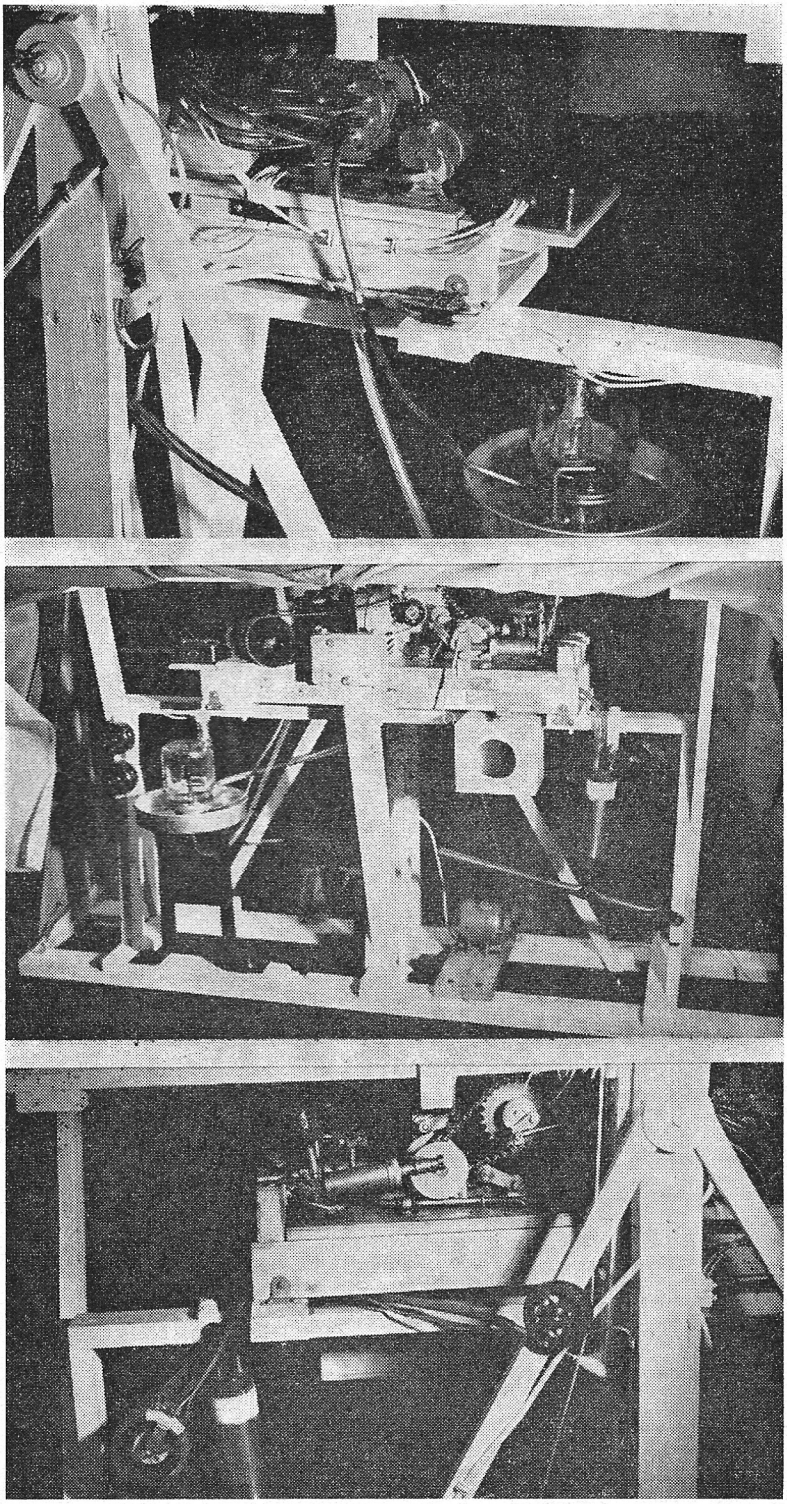
An electrical contact, working in unison with the ratchet and discs, ensures that the correct light flashes at the instant. A spring-laden weight, operated by a crank on the opposite end of the mainshaft, drives the ratchet arm and produces the boom.

Through a chain and sprocket, a 240 v. electric motor powers the mechanism which produces the combination of effects and also rocks the vessel. A low voltage transformer is used for the current supply for the small cannon lamps.

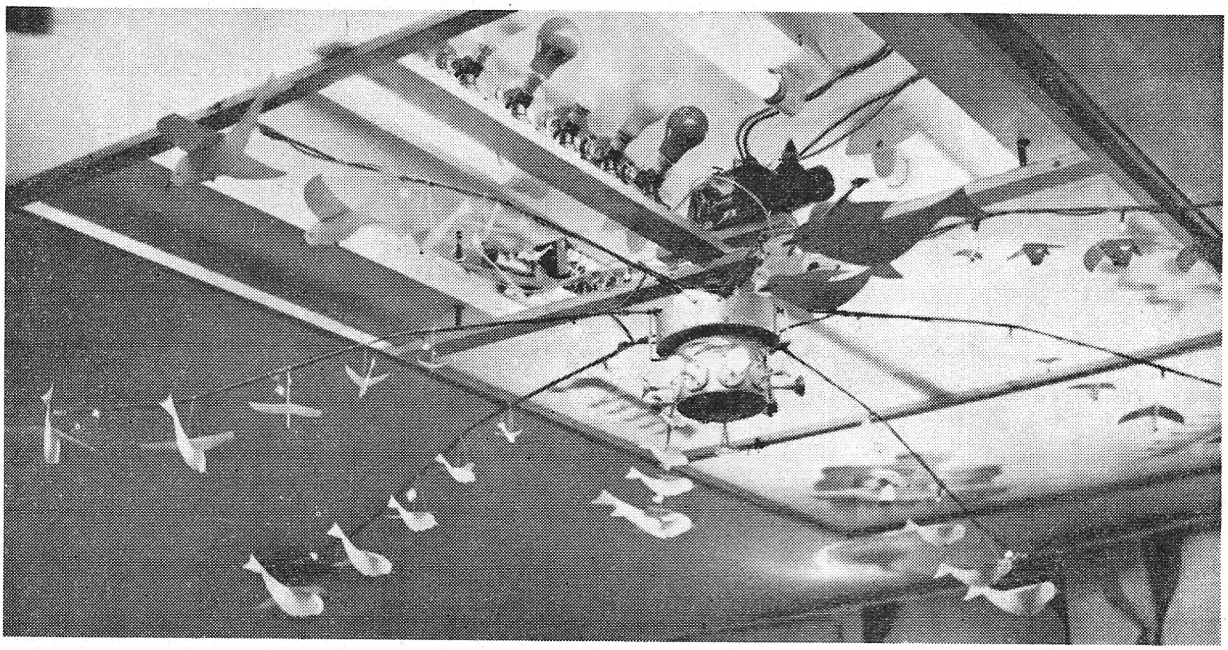
Lighting up

As it is not possible to light the cigarettes by compressed air, though it keeps them glowing when they are alight, a manual vacuum pump is incorporated which, by a few rapid strokes, allows the eight Nelsons to be lit very quickly.

Mr Scott's biggest trouble was to get the correct gear ratios and precise synchronisation. He spent much time in experimenting before he had flash,



Top: Smoke distributing pipes to the guns emanate from the disc, on which are the pawl and ratchet. Centre: Sea turned back to reveal guns, sprockets, motor and pumps. Above: Air is forced into the holder by twin compressors



Translucent ceiling panel withdrawn to show the mechanism controlling the seagulls

smoke and bang of each of the eight guns exactly right. Fine screw adjustments eventually proved the answer. For the ship itself he used ME plans, with certain departures.

In the centrepiece 40 seagulls are suspended from eight thin steel arms radiating from a central unit. The wing spans range from 8 in. to 3½ in.

Each arm, where it enters at the top of the turret, has a small grooved wheel which runs on an undulating edge forming the turret top. As the arms rotate, the undulations cause them to weave up and down, the seagulls swooping and weaving. A central speaker within the turret structure provides raucous seagull noises.

Behind the transluscent lighting panel, beneath which the seagulls fly, coloured lights flicker to a controlled sequence The speaker requires 3½ to 4 v.; the torch lights 12 v. d.c.; the electric motor 24 v. d.c.; and the large coloured lights 240 v. a.c.

Mr Scott has been an enthusiastic reader of MODEL ENGINEER for many years. While building his gay party piece he found much useful information in the pages of ME.

FATIGUE STRENGTH OF MILD STEEL STUDS

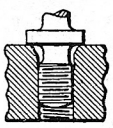
An investigation has been carried out to test the relative strengths of the five types of mild steel stud illustrated here. Each is based on a 1 in. nominal diameter 8 t.p.i. Whitworth thread form in mild steel. Tests were made of the stresses in the assembly by a photoelastic technique, and fatigue tests were carried out on an assembly of each type subjected to repeated axial loading. The results of the two forms of test were in substantial agreement. They showed that the most satisfactory form of stud was the relieving groove design, followed in descending order by the recessed stud, collar stud, normal stud and bottoming stud.

The relieving groove design stud used in the tests had a collar diameter equal to the major diameter of the thread. It fitted a socket which opened with a very slight bevel.

The work formed part of the research programme of the British Shipbuilding Research Association.

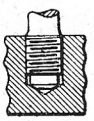
Relieving groove stud

Recessed stud Parallel bore length = 0.375 × major diameter



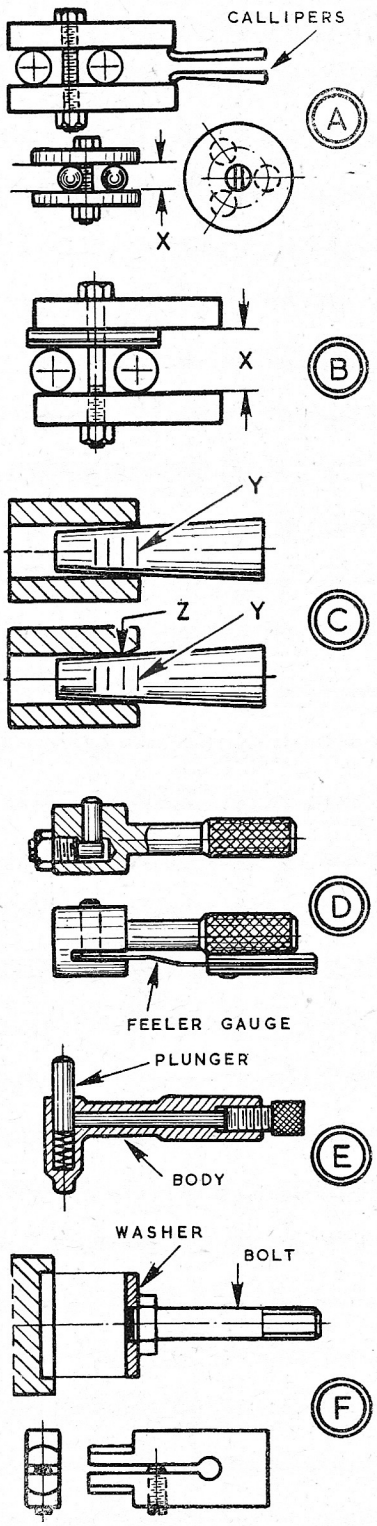
Collar stud Collar diameter = 1.375 × thread major diameter

Normal stud locking in the socket where the thread runs out to nothing



Bottoming stud 120° conical seat

GAUGING SMALL and MEDIUM BORES



If you have a standard outside micrometer and inside callipers, a great variety of small and medium sized bores and short length dimensions—both outside and inside—can be verified to a high standard of accuracy. For merely checking a bore, its size is carefully taken by the inside callipers, and these are used in the micrometer to obtain the actual dimension.

In machining a bore, close checks can begin when it is still several thou undersize. The micrometer is set, say, 0.010 in. under the dimension, and the callipers are adjusted to it. Then fairly heavy cuts can be taken until they will just enter the bore. For important work, this may be the time to resharpen the tool and take two or three fine cuts—to eliminate slight bell mouthing from trial cuts, see the sort of finish produced, and ensure that all is satisfactory.

If there is doubt about the lathe cutting parallel, this procedure should be adopted well before the finished dimension, while ample metal still remains for you not to risk running near the finished size in making testing cuts after adjustments.

There are, of course, many variations from this basic method, some employing callipers. If the bore is to be finished by a reamer, you can take the size from it, boring out a suitable washer in the chuck until the reamer will enter to finished size—the washer then serving as a reference for the callipers. As most reamers have a taper at the end, a second and undersize washer provides for a pre-check, with the callipers used well into the bore to verify parallelism.

Dimensions may be taken with the callipers in two pieces of flat plate which are lightly bolted to rollers or to short pieces of silver steel rod, *A*. This material is usually very accurate. Three steel balls may be similarly employed with stiff flat washers to obtain their dimension, *X*; while four pieces of accurate rod and a pair of plates, *B*, provide a larger dimension, *X*. These methods can be useful when you have no micrometer to ensure a high standard of accuracy. For preliminary undersize testing, the callipers can be adjusted loosely in the plates; and should oversize be necessary, shimstock can be used with the rod or balls.

For precise spacing of plates, drill shanks may not be sufficiently accurate—which goes for many square lathe tools, even though they may be ground all over. Preferably both should be checked before use.

For gauging directly without use of callipers, silver steel rod makes a good substitute for an ordinary plug gauge. Tapered at the end, it indicates the approach of finished size. Long tapers can be turned on pieces by angling the top slide, but slight chamfers require only careful work with a smooth file and emery cloth.

Care is required in checking bores with a taper gauge when it is not to be entered fully. If a bore is parallel throughout its length, a taper gauge, *C*, can be let in to a reference mark *Y*, which may be the size from which a reamer is used; should the bore be bell-mouthed (from trial cuts, or the tool cutting keenly at the start), mark *Y* may still be flush, but with the bore at a smaller diameter, *Z*. This could leave too much for the reamer. A right-through taper gauge, or a check with callipers, reveals the error.

For special cylinder bores, an accurate check in machining and lapping is kept with a plunger plug gauge, *D*. It may have a screw at the end with an eccentric diameter for adjustment; or there can be a slot into which feeler gauges or strips of shimstock can be slipped beneath the plunger. For larger bores, a telescopic gauge, *E*, can be used, its plunger extended by a spring and locked by a rod and screw in the body. Either can be set or checked by micrometer.

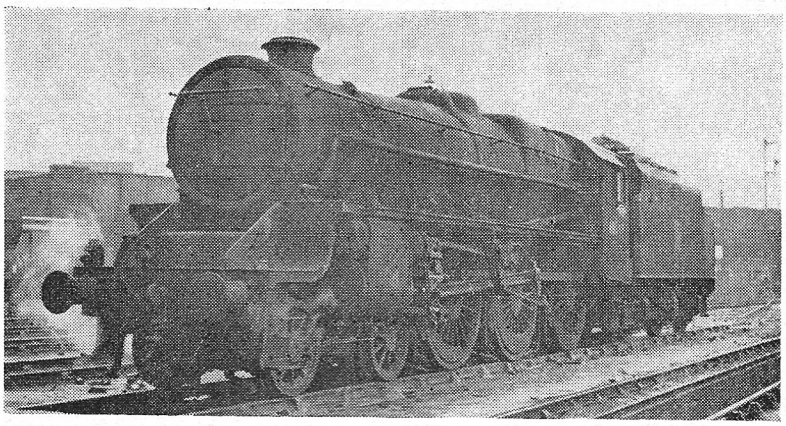
For checking a recess, a quickly-made gauge, *F*, consists of a washer soldered to the shouldered head of a bolt, and then turned to size. The other gauge for smaller and deeper diameters is machined from rectangular mild steel and provided with an adjusting screw. ▣

WORKSHOP HINTS and TIPS

By GEOMETER

These will be saved

British Railways have issued a list of more engines to be preserved . . . It is still not quite long enough to satisfy steam enthusiast ROBIN ORCHARD



Picture taken at Edge Hill, Liverpool of No 45249. *An engine of this Stanier class—the Black Fives—is on the list of engines to be saved*

WITH the closing of the steam age railway enthusiasts have been wondering what locomotives would be preserved. Three years ago British Railways set up a consultative panel consisting of members of the Commission's Historical Relics Department, railway historians, and representatives of the historical railway societies. Their task was to determine what should be preserved.

The panel has now issued its list of engines recommended as worthy of being added to those already preserved. Together they will illustrate the development of the steam railway locomotive from its earliest days to the close of the era.

In 1953 12 locomotives were scheduled for preservation. Of these, ten have already been preserved and two remain in service. The list is as follows:

Metropolitan Railway
A class 4-4-0*T No* 23 *built in* 1866.
Lancashire and Yorkshire Railway
K2 class 2-4-2*T No* 1008 *built in* 1889.
Great Eastern Railway
T26 class 2-4-0 *No* 490 *built in* 1895.
Great Western Railway
2301 *Dean Goods class* 0-6-0 *No* 2516, *built in* 1897.
Highland Railway
Small Ben class 4-4-0 *No* 2 Ben Alder *built in* 1898.
South Eastern and Chatham Railway
D class 4-4-0 *No* 737, *built in* 1901.
Midland Railway
4 *class* 4-4-0 *Compound No* 1000, *built in* 1902.
Great Western Railway
28*XX class* 2-8-0, *built* 1903. (*Not yet preserved*).
London Tilbury and Southern Railway
79 *class* 4-4-2*T No* 80 Thundersley, *built in* 1909.
Great Central Railway
04 *class* 2-8-0, *built in* 1911. (*Not yet preserved.*)
North British Railway
Glen class 4-4-0 Glen Douglas, *built in* 1913.
Great North of Scotland Railway
F class 4-4-0 *No* 49 Gordon Highlander, *built in* 1920.

All have been preserved except the GWR 28XX 2-8-0 and the GCR 04 class 2-8-0. The new list covers a further 27 locomotives:

Western Region
Castle class 4-6-0 *No* 4073 Caerphilly Castle, *built* in 1923.
King class 4-6-0 *No* 6000 King George V *built in* 1927.
94*XX class* 0-6-0*PT*, *built in* 1947.

Southern Region
0298 *class* 2-4-0*WT* Beattie *well tank*, *built in* 1874.
M7 class 0-4-4*T*, *built in* 1897.
T9 class 4-4-0, *built in* 1899.
King Arthur class 4-6-0, *built in* 1925.
Lord Nelson class 4-6-0, *built in* 1926.
Schools class 4-4-0, *built in* 1930.
Q1 class 0-6-0, *built in* 1942.
West Country or Battle of Britain class 4-6-2, *built in* 1945.

Midland Region
G2 class 0-8-0, *built in* 1921 (*LNWR*).
4*F class* 0-6-0, *built in* 1924 (*Hughes-Fowler*).
5 *class* 2-6-0, *built in* 1926 (*Hughes-Fowler*) *Crab*.
5 *class* 4-6-0, *built in* 1934 (*Stanier*) *Black Five*.
4 *class* 2-6-4*T built in* 1935, *three cylinder*.
7*P class* 4-6-2 *No* 6235 City of Birmingham.

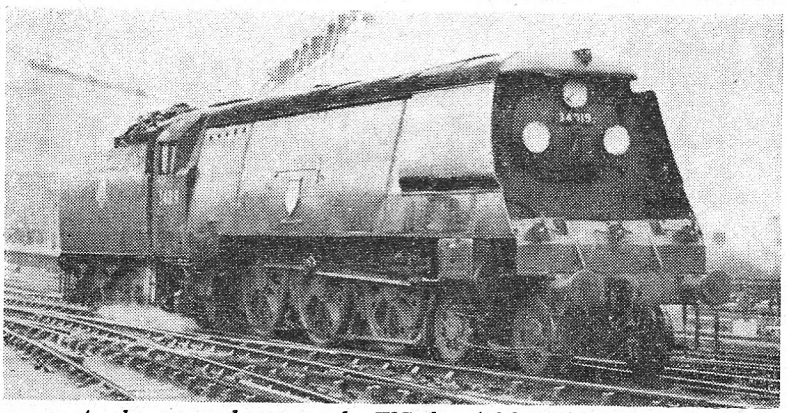
Eastern Region
C class 0-6-0 *No* 1576, *built in* 1891 (*NER*).
P57 class 0-6-0*T No* 87, *built in* 1904 (*GER*).
T3 class 0 8 0, *built in* 1919 (*NER*).
11*F class* 4-4-0 *No* 506 Butler Henderson, *built in* 1920 (*GCR*) (*Director*).
V2 class 2-6-0, *built in* 1936.
A4 class 4-6-2 *No* 4468, Mallard, *built in* 1938.

British Railways
7 *class* 4-6-2 *No* 70000 Britannia, *built in* 1951.
8 *class* 4-6-2 *No* 71000 Duke of Gloucester, *built in* 1954.
5 *class* 4-6-0 *with Caprotti valve gear*.
9 *class* 2-10-0 *No* 92220 Evening Star, *built in* 1960.

Having studied the list do you think it covers the development of the steam locomotive properly? It certainly covers most of the story, but I still think some more engines should be included.

An example of the County or 1000 class 4-6-0s deserves a place. To me, the County represents the pinnacle of two-cylindered, high-powered locomotives. The Star might mark the birth of the 4-6-0 fast passenger, but the ultimate development of the medium 4-6-0 was undoubtedly reached in the County.

None of the GWR Prairie tanks has been scheduled. Considering how the Prairies have been modified and



Another type to be preserved: WC class 4-6-2 No 34019 BIDEFORD

improved with each successive class, it seems strange that one of them is not on the list.

Again, the 47XX merits a place. Here, surely, is the climax of 2-8-0 design. I have heard GWR drivers say that after the Kings and Castles the 47XX engines are the best on the system.

An engine of the 14XX 0-4-2T class might be saved to represent the final development of a type once extremely common and evolved purely for the working of branch lines. It would help also to show the versatility of the steam locomotive.

There are three locomotives on the Southern Region which I think might be included. The 0415 class 4-4-2Ts show how the 4-4-2T design began and how it was made to standardise a little with the main line 4-4-0 of the period. So far only one 4-4-2T, *Thundersley*, has been preserved. While it illustrates the design at the end of its development the Adams 0415 represents it at an earlier stage.

I find it incredible that the list contains no engine of the rebuilt Merchant Navy class. Surely the recent Merchant Navy rebuilding has been the final stage in the development of the steam locomotive? A top express engine is already being considered for preservation on the other regions; why should the Merchants be excluded.

The list also lacks an example of the really heavy freight tank, able to haul many wagons at high speed. One of the three-cylinder W class 2-6-4Ts should be included?

I think it a great pity that one of the very successful Royal Scot class 4-6-0s is not there from the Midland. It was built up on the design of the Lord Nelson and King class 4-6-0 and would have provided an interesting comparison.

A Princess Royal Pacific would well represent the transition from the 4-6-0 to the big Pacific type, such as the Duchess. Together with a Somerset and Dorset 2-8-0 we could see a Caledonian bogie engine. We have a Highland, a GN of the SR and a NBR 4-4-0; the Caledonian would help to show how the companies strained to produce the best and snatch traffic from their rivals. The Scottish railways competed over almost identical routes, and their locomotives were always at the forefront of design. What a pity no example exists of the Glasgow and South Western Railway 4-6-0s!

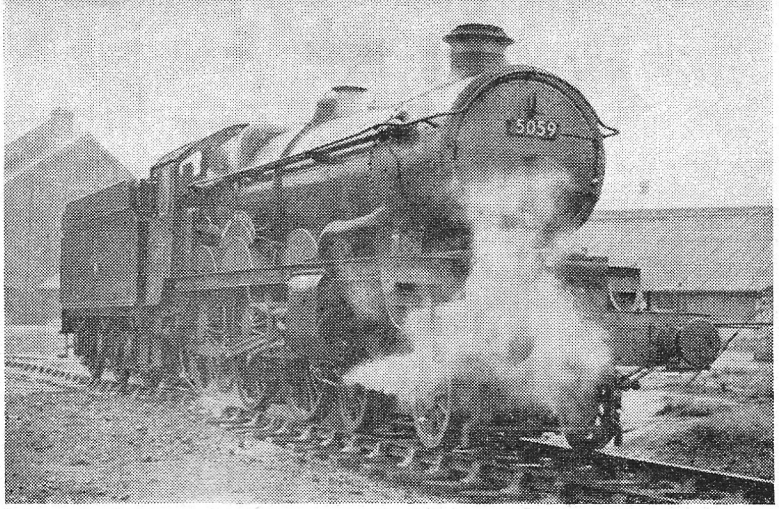
Nowhere among the chosen is a large passenger tank from the Eastern, a type once fairly common. It is now impossible to preserve one, but at the time that the list was drawn up the A8 and A5 classes were still running. Here is a serious gap in the collection.

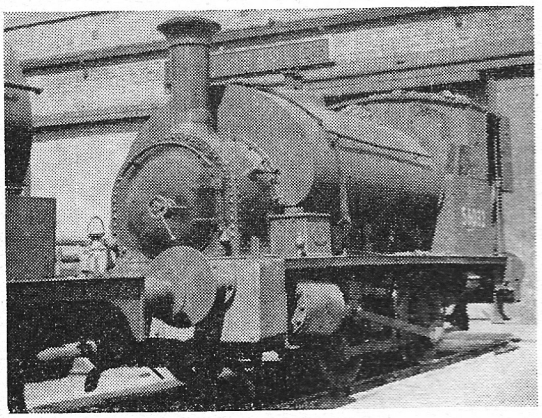
The B16 class 4-6-0, too, deserves a place to illustrate a successful development in the design of mixed traffic locomotives, and the B12 class should be represented as the list has no example of the inside-cylindered 4-6-0s.

And why not a Pug? It would show the tremendous versatility of the steam locomotive and it would not even need much room.

The Cardiff Railway 0-4-0ST, the Caledonian Railway 0-4-0ST and the North British Railway 0-4-0ST are all very worthy of preservation.

● *Continued on page 309*

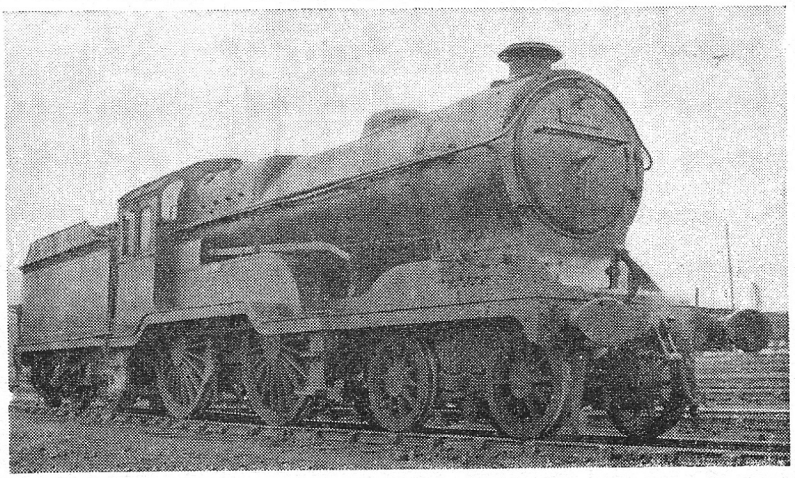




Top of page: 5059 EARL ST ALDWYN *at its native Swindon.* CAERPHILLY CASTLE *will not disappear*

Left: Many would be pleased if a quaint Caledonian Pug were placed on the list

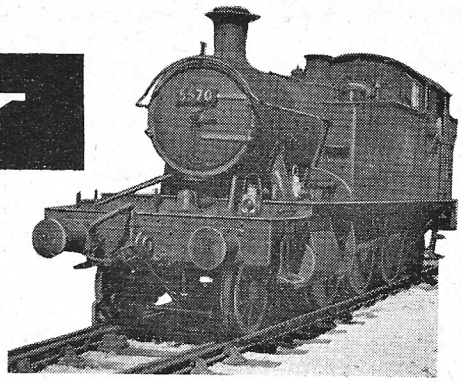
Below: *No* 62670 MARNE—*at Sheffield —has been broken up. Another of the GCR Directors class the* BUTLER HENDERSON, *is being restored at Gorton*



Continued from 23 February 1961, pages 234, 235 and 236

FIREFLY

A GWR 2-6-2 TANK ENGINE OF THE 45XX CLASS



Frame stretchers, wheels and axles are among the parts described by MARTIN EVANS for the engine in 3½ in. gauge

THIS week I will deal with some more of the components for the 3½ in. gauge *Firefly*. To save expense, all the frame stretchers can be cut from mild steel, ¼ in. thick for the four rectangular stretchers and ⅜ in. dia. for the two round stretchers.

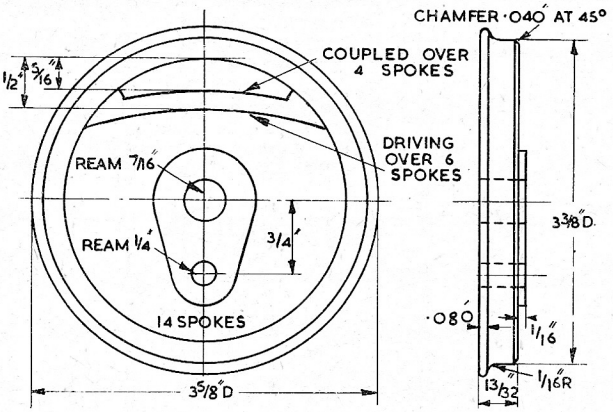
Note that the stretcher which comes immediately above the leading pony truck wheels is ¼ in. shorter than the others. The reason is that a ⅛ in. thick stiffening piece of steel has to be riveted behind each frame plate to strengthen up the rather shallow depth of the frame at this point. There is no need, I think, to give a drawing of them; two pieces 2⅜ in. long and 11/16 in. deep are fastened on with five ⅛ in. dia. iron rivets apiece, countersunk on both sides.

The two round stretchers are arranged one above the other just to the rear of the driving axle. A 1/16 in. thick plate can be bolted to the rear of them, the full width and height of the frames—2⅞ in. × 2¾ in. The plate will help to keep ashes and grit away from the valve motion.

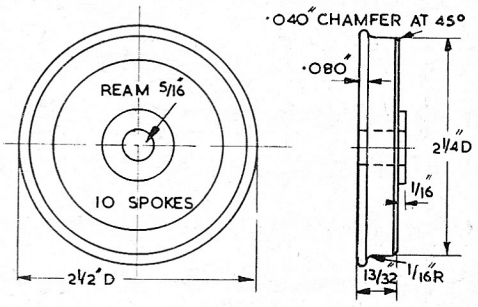
Our next items are the main horns, which can be the standard hot-pressed type from ME advertisers. They will need only a quick clean up with a file on the side next to the frame. A No 30 hole can be drilled for an oil pipe a little to one side as shown. Eight 3/32 in. iron rivets are used, hammered into countersinks on the outsides of the frames in the usual way. Each horn should be marked with a small number or letter so that the axleboxes may be individually fitted.

Before beginning on the wheels and axles, we may as well turn up and fit the two bushes for the weighshaft. This work is much easier while the frames are still apart. Turned from a good quality phosphor-bronze, the bushes will last the life of the engine. Turn them to a tight press fit in the 7/16 in. dia. reamed holes in the main-frames and note that they are put in from the inside, so that they come flush on the outsides of the frames. Put the 5/16 in. dia. reamer through again, after pressing home, in case the bush has been compressed a bit while being forced home.

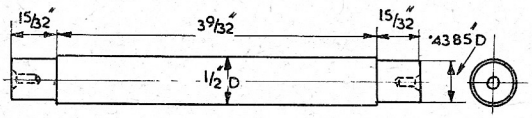
The pony truck pivot pins can now be turned up from 5/16 in. dia. silver steel. They are made a tight press fit in the appropriate frame stretchers.



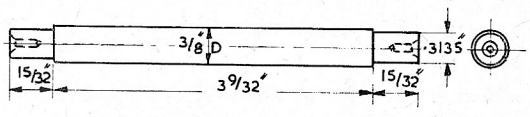
DRIVING & COUPLED WHEEL 6 OFF



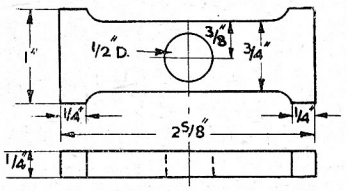
PONY TRUCK WHEEL 4 OFF



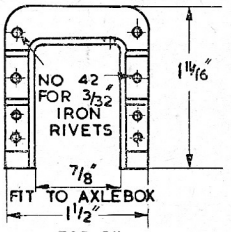
MAIN AXLE 3 OFF GROUND MS

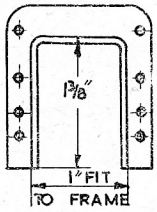


PONY TRUCK AXLE
2 OFF GROUND MS



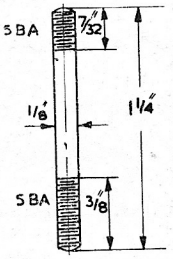
LEADING PONY TRUCK STRETCHER 1 OFF BMS



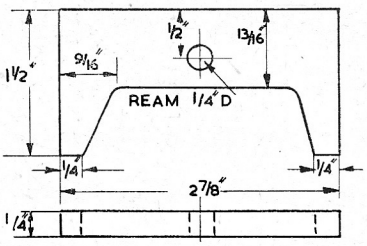


MAIN HORN

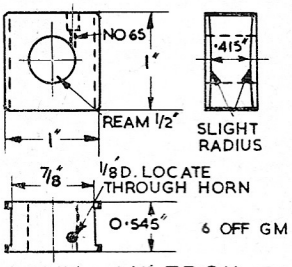
HOT PRESSING IN G M 6 OFF



SPRING PIN FOR MAIN AXLEBOX 12 OFF BMS

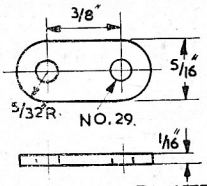


LEADING PONY TRUCK PIVOT STRETCHER 1 OFF BMS

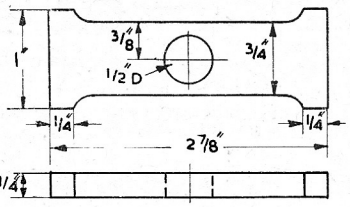


6 OFF GM

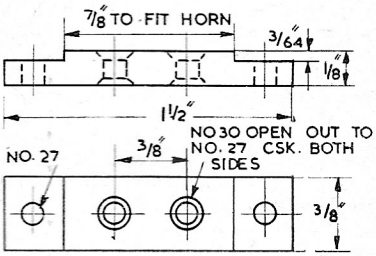
MAIN AXLEBOX



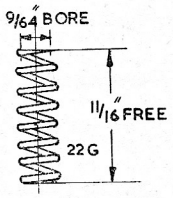
SPRING PLATE 6 OFF BMS



TRAILING PONY TRUCK STRETCHER 1 OFF BMS

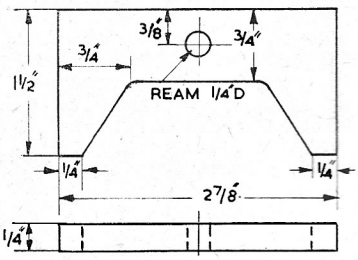


HORNSTAY 6 OFF BMS

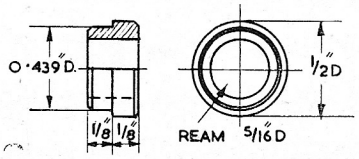


SPRING FOR MAIN AXLEBOX

12 OFF HARDEN AND TEMPER

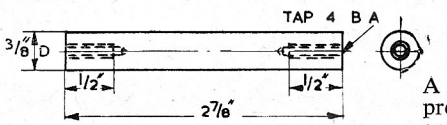


TRAILING PONY TRUCK PIVOT STRETCHER 1 OFF BMS



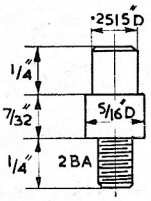
BUSH FOR WEIGHSHAFT

2 OFF GM



ROUND FRAME STRETCHER

2 OFF BMS



PONY TRUCK PIVOT PIN

2 OFF SILVER STEEL

A Simmonds or GKN vibration-proof nut can be used or the bottom end can be drilled for a $\frac{1}{16}$ in. dia. split pin. My choice will definitely be the former.

Castings for the driving and coupled wheels will be offered by advertisers very shortly. As they measure only $3\frac{5}{8}$ in. over the flanges, they are not a very tough job for the average 3 in. to $3\frac{1}{2}$ in. centre lathe.

Readers who remember my *Jubilee* articles may notice that I have this time specified flanges $\frac{1}{8}$ in. deep rather than 7/64 in. This is because enthusiasts with greater actual driving experience than myself tell me that the extra depth gives them more confidence that the locomotive will hold the road at high speeds. Those who prefer to see wheels rather nearer to scale can stick to 7/64 in., which is enough for any normal speed on a reasonably aligned track.

In my opinion, anyone who has tried a carbide tool for wheel turning will never go back to high-speed. I am well aware that high-speed will do a good job, but with high-speed tools it is always necessary to re-grind at least once, and sometimes two or three times, in dealing with a set of six wheels. This complicates the problem of machining all wheels to exactly the same dimensions. Again, if a hard spot is encountered in a casting, the carbide tool will generally sail through it, but the high-

speed tool will not; the casting may have to be removed for a touch on the grinding wheel, and the tool reground. Finally, in all but the smallest lathe turning can be done at a greater speed where carbides are in use.

While it is true that the carbide needs a special grit wheel for sharpening, my experience is that the tools will machine as many as 20 wheels of average size without being touched. Even then, only the merest trace of wear is apparent.

I will not go into the wheel turning in great detail, except to say that it is definitely worth while to use a boring tool to bring the bores up to reaming size—three or four thou below the nominal one. Relying on drills alone may be all right for small wheels, but where the casting is over 2½ in. dia., a slight wobble can creep in which, of course, the boring tool definitely eliminates.

Many people still turn their flanges absolutely square, with no radius between flange and tread. I cannot help feeling that this is a dangerous method; apart from friction on sharp curves, there is always the possibility that a flange will become cracked or chipped. A radius of about $\frac{1}{16}$ in. is about right for $\frac{3}{4}$ in. scale.

Some kind of jig is essential for drilling driving and coupled wheels for crankpins. I use just a length of mild steel about $\frac{3}{4}$ in. × $\frac{3}{8}$ in. with the longitudinal centre-line deeply scribed. A $\frac{3}{16}$ in. hole is drilled and reamed and lightly countersunk at a suitable position with another hole at $\frac{3}{4}$ in. from it, and about $\frac{3}{8}$ in. dia. Into the second hole a short peg of $\frac{7}{16}$ in. silver steel, turned down to $\frac{3}{8}$ in. plus and pressed into the bar, locates the wheel centre.

A simple jig like this takes only a few minutes to make and does not need hardening for six wheels. After all the wheels have been drilled in turn, the crankpin holes are opened out with letter D drill and then reamed $\frac{1}{4}$ in. diameter.

The driving axles are turned from $\frac{1}{2}$ in. dia. ground mild steel as usual, and the pony truck axles from $\frac{3}{8}$ in. Even if not actually turned between centres, for the sake of appearance centres should be put in the ends of all axles. The wheel seats should be 0.001 in. larger than the nominal bore of the wheels, and the ends should be very slightly tapered to enable the wheel to start. The length of the wheel seats should be such that when the wheel is pressed right home, the axle protrudes about 0.005 in. through its boss.

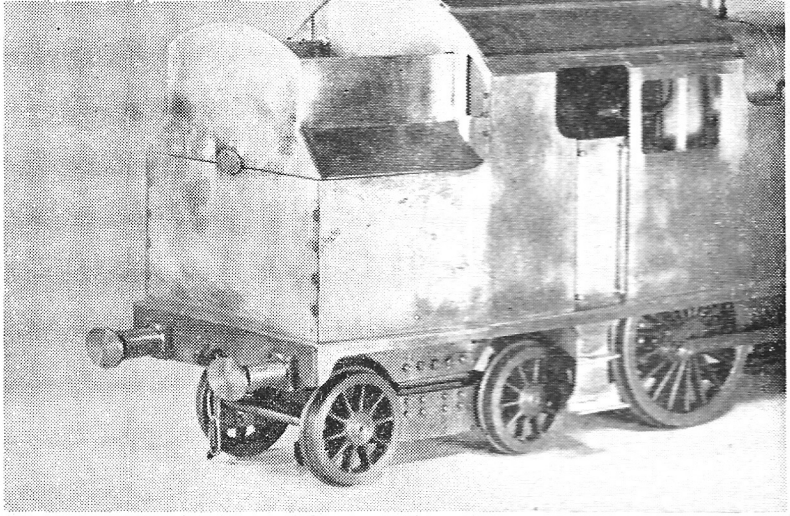
The main axleboxes are generally supplied cast in a stick, and so the sides, front and back can be milled in one cut each. The groove can be cut very easily in the lathe with a $\frac{3}{8}$ in. end mill, with stick held in a machine vice on the vertical slide.

There is just room for the usual $\frac{1}{8}$ in. dia. spring pins underneath the axlebox. A point worth noting is that the threaded upper end of the pins should be cut a shade oversize, so that once they are screwed home into their respective axleboxes, they will not come out again unintentionally when the nuts are being adjusted underneath the springs.

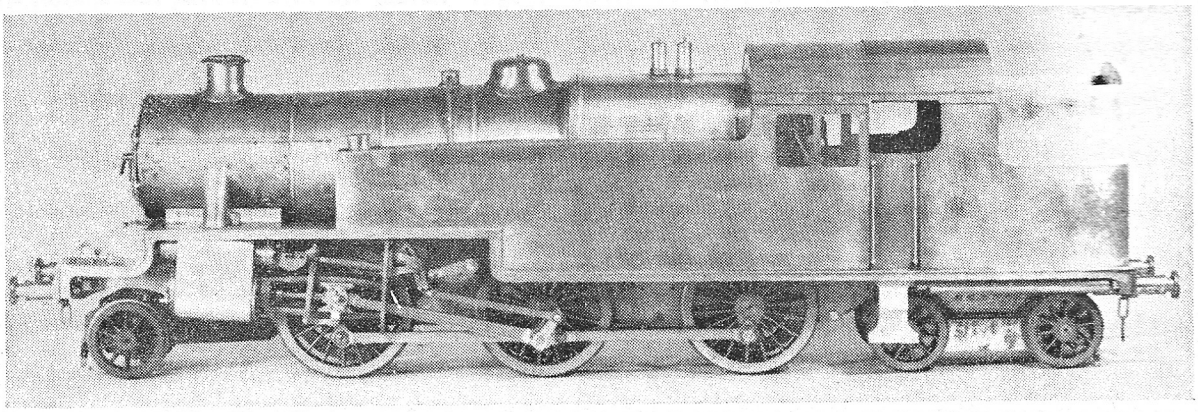
The hornstays are cut from $\frac{3}{8}$ in. × $\frac{1}{8}$ in. mild steel strip and are milled or filed at each end to a depth of 3/64 in. a tight fit between the bottoms of the horns. The spring plates are from $\frac{5}{16}$ in. × $\frac{1}{16}$ in. mild steel, and the springs could be wound up from 22 s.w.g. piano wire. A mandrel about $\frac{1}{8}$ in. dia. will probably be about right for winding them. The exact length required is best determined when the locomotive has been completed and its precise weight in working order is known.

My picture show the removable upper part of the bunker which I have just fitted to *Jubilee*. It is sprung into position and can be removed immediately without the taking out of any screw.

★ *To be continued on March 23*

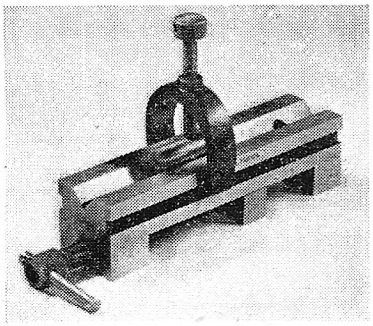


Bunker for JUBILEE



New side view of JUBILEE. *The engine is now ready for painting*

AROUND THE TRADE



The Eclipse V-vice

Two of the most useful workshop accessories are combined in this ingenious device, and they can be used either singly or conjointly. It comprises an all-steel parallel machine-vice, having a 90 deg. V-groove machined on the underside. Grooves along the two sides serve to anchor a stirrup clamp, adjustable laterally to hold work in the V-groove. It is thus possible to use the appliance either way up, as a vice or V-block respectively, the contact surfaces in either case resting truly on the surface plate or machine table. If it is necessary to hold it down, this can be done with the aid of suitable clamps arranged to engage the side grooves.

Two sets of moving vice jaws, each fitting the end of the screw with a spring locking device, are provided. The shorter of the two, seen in the photograph, gives the maximum width of opening, while the other enables thin work to be held. It has the gripping face V-grooved vertically and horizontally for holding round work, and it is also drilled crosswise to form a holder for two dowels, which may be removed and used for parallel packings when required. A $\frac{5}{16}$ in. hole drilled vertically through the body, adjacent to the fixed jaw, enables rods of any length, up to this diameter, to pass through it.

The body of the vice is 5 in. long $\times$ $1\frac{1}{4}$ in. wide, and the maximum opening is 3 in. Round work up to 1 in. dia. may be held in the V-groove by the stirrup clamp. All important surfaces are ground to a close limit of accuracy. We have found this tool extremely useful and adaptable, with innumerable applications for holding and positioning work either in machine tools or on the bench. Eclipse tools, made by J. Neill and Co. Ltd, Sheffield, are obtainable from all tool dealers.

Slide rules

In this scientific age, slide rules are playing an ever increasing part, more and more people are using them than ever before, not only in drawing offices and schools, but in all walks of life.

The Unique range of slide rules has now been completely redesigned to meet this growing demand. We have had over 30 years of experience in the manufacture of slide rules. The combination of this experience, plus the "know how" has enabled Unique to produce a range of slide rules that for accuracy, cost and length of life, have no equal in the world.

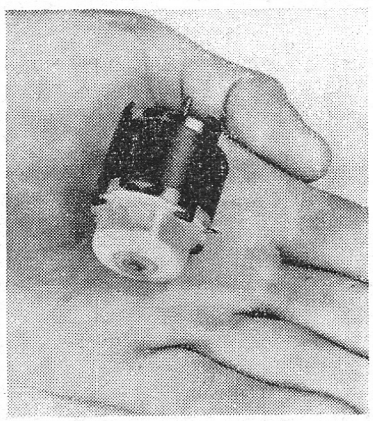
In every corner of the globe there is a Unique Slide Rule, 40 per cent of all those manufactured go to the North American continent. Large quantities are also sent to South Africa, Middle East and the Far Eastern countries. Up to the present time, supplies go to no fewer than 28 countries.

We have examined sample scales of the Chemical Slide Rule, retailing at 19s. 6d., the Universal One and Universal Two slide rules, both retailing at 16s. and the 10 in. Log-Log slide rule, retailing at 11s. 6d.

Also apart from slide rules, we do a large trade in drawing instruments of all kinds. The adjustable squares and set squares made in durable Perspex, have few equals, in price or quality, anywhere.

A novel miniature motor

A small low-voltage motor having several interesting features of design has been submitted for inspection and test by Samson's Surplus Stores, Ltd, 169-171 Edgware Road, London W2. It is of the permanent field magnet type, directly-reversible by changing the polarity of terminals, and runs on 4 v. with low current consumption. The diameter is $1\frac{3}{16}$ in., length over bearings $1\frac{9}{16}$ in., and over shaft ends, 2 in. No screws or bolts are used in construction; the pressed steel circular shroud holds the plastic endplates in position, and the latter incorporates self-lubricating bearings. An internal reversing switch is fitted in one endplate.



On test over a prolonged period, the motor ran consistently and with quite a powerful torque for its size. It is suitable for many purposes in model engineering, including the propulsion of model boats, cars and locomotives, also for the various mechanical requirements in radio controlled models.

The above firm also stocks a wide range of electrical apparatus, including meters, transformers, rectifiers, etc., of all types and sizes.

Material supplies

K. R. Whiston, of New Mills, Stockport, is a name to keep in mind whenever the problem of supplies crops ups.

He carries a large range of nuts and bolts, pressure gauges, gears, pulleys, electrical items and general materials which the home engineer needs so frequently.

He pays particular attention to the requirements of model engineers and maintains useful stocks especially for them.

Why not write and ask for his latest catalogue ?

Catalogues received

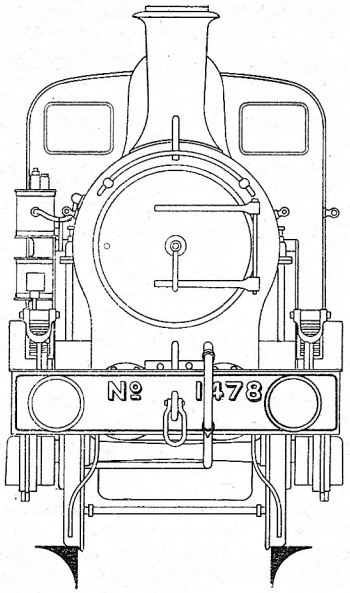
Messrs Watson's, Eastern Motors, Aldeburgh, Suffolk, have sent us their list of ex-service surplus apparatus, which includes a wide range of industrial engines, generator sets, electric motors, converters and transformers, also optical instruments and many miscellaneous items.

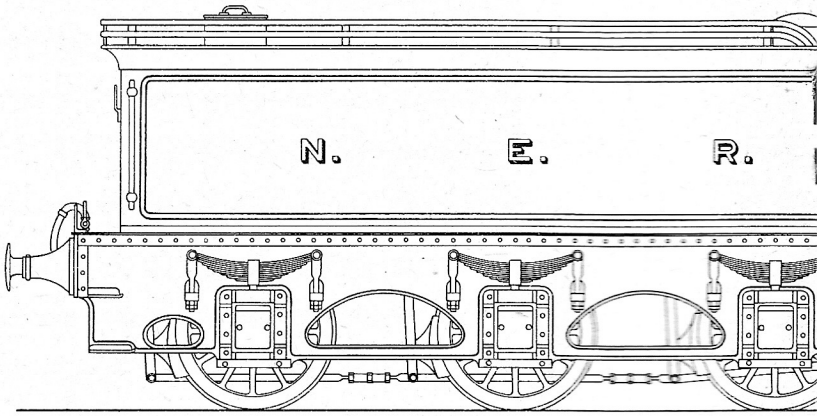
Metal scrapers

Hard metal scrapers with replaceable blades have just been introduced by Messrs Protolite, of Rainham, Essex.

It is claimed that the use of hard metal in the cutting tip, made practicable by the separate blade, gives longer life and proves more economical because of reduced servicing.

The scraper is available in three sizes: 1 in. £2 11s. (spare blade 25s.), $1\frac{1}{4}$ in. £2 13s. 6d. (27s. 6d.), and $1\frac{1}{2}$ in. £2 16s. 6d. (30s. 6d.).





LOCOMOTIVES I HAVE KNOWN

From the posthumous papers of J. in his familiar style to a much-a

THE NORTH EAS

FOR something like 70 years in the history of British railways, the 2-4-0 type of locomotive was extremely popular, at first for freight and general mixed traffic and later for all classes of passenger traffic, even to the fastest expresses of the period.

The type was a convenient one on which to design a compact, simple, powerful and speedy engine, and in the 1870s and 1880s several railways produced examples that became famous for the excellent work which they did. In my *Locomotives I Have Known* I have already dealt with some of the more notable of them.

Here was a class of fine 2-4-0 engines which I wish I had known better, for I have always admired them. Not only did they become celebrated for the good, not to say outstanding, work which was always got out of them, but the circumstances of their coming into existence are probably unique in locomotive history.

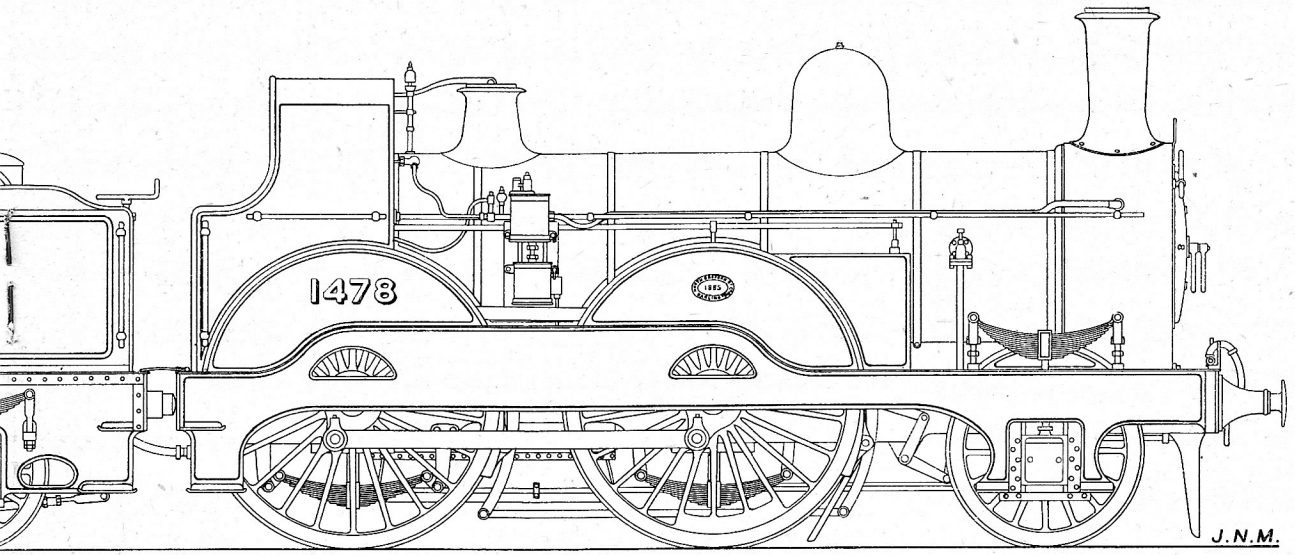
In 1884 Alexander McDonnel, locomotive superintendent of the North Eastern Railway, suddenly resigned. He had held the post for only about twelve months, having succeeded the redoubtable Edward Fletcher in the previous year. In that short time, McDonnell's only notable achievement was to have made himself so unpopular with the stolid Northumbrians and Yorkshiremen with whom he had to deal that his position became quite untenable.

This unfortunate situation arose just after the NER directors had publicised their intention of running certain of their expresses non-stop each way between Newcastle and Edinburgh. They had no locomotives which could be relied upon to make that 124¼-mile non-stop trip successfully !

William Henry Tennant, the NER general manager, hurriedly called together a committee of locomotive officials and instructed them to prepare a new design immediately. The result was the "Tennant" class of 2-4-0 express passenger engine, 20 of which were built in 1885. They were numbered 1463 to 1479, 1504, 1505 and 1506. Ten of them were built at Darlington and the other ten at Gateshead. In spite of all the hurry in which they were designed and built, the Tennants were outstandingly successful; they had no trouble whatever in working the Newcastle-Edinburgh non-stop trains; but in 1888 some of them made several record runs between York and Newcastle during the London-Edinburgh races of that year, when No 1475 seems to have been quite a star performer. On August 25, 29, 30 and 31, she is reported to have run 100-ton trains over the 80½ miles from York to Newcastle in 80, 81, 82 and 78 minutes.

On the 28th of the same month, No 1505 ran the entire distance of 124¼ miles from Newcastle to Edinburgh non-stop in 127 minutes, a performance which, for the period, was unequalled. In fact, the Newcastle-Edinburgh non-stop booking was the longest in the country then, and the Tennants proved that such a run gave no trouble from the locomotive point of view, provided that the engines were suitably designed.

The dimensions of the engines were: cylinders 18 in. dia., 24 in. stroke; leading wheels, 4 ft 7¼ in.; coupled wheels 7 ft 1¼ in.; wheelbase, 16 ft 8 in. divided into 8 ft and 8 ft 8 in. The overhangs were 4 ft 1 in. at the front and 4 ft 2 in. at the back. The tender wheels were 3 ft 9¼ in. dia. and the wheelbase was 12 ft 8 in. equally divided; overhang was 4 ft 2 in. at each end. The total wheelbase of engine and tender was 38 ft 7¾ in. and the total length over buffers was



N. MASKELYNE comes this tribute
dmired 2-4-0 engine of the eighties

STERN TENNANTS

49 ft 11¾ in. Water capacity was 2,651 gallons, and there was space for five tons of coal.

The boiler barrel was 10 ft 7 in. long, and the distance between tube-plates was 10 ft 11⅛ in.; the diameter was 4 ft 3 in. outside, the barrel being made, apparently, in one ring with a butt-strip along the bottom. The centre-line was pitched 7 ft 2½ in. above rail level.

There were 205 tubes of 1¾ in. dia. the heating surface of which was 1,026 sq. ft. The firebox casing was 5 ft 10 in. long and the inner box was 5 ft 1⅝ in. long at the grate, tapering to 5 ft 0⅜ in. at the crown; its heating surface was 107 sq. ft, making the total 1,137 sq. ft. The grate area was 17.3 sq. ft, and the working pressure 160 p.s.i.

According to the official diagram, from which all these particulars are taken, the Stephenson valve gear was designed to give a maximum valve travel of 4¼ in. and a full-gear cut-off of 60.3 per cent. The valves were flat with 1¼ in. lap and no exhaust lap or clearance. Particulars of port sizes are not given, but it is clear from the other information that the engines were deliberately designed to run fast. It is generally conceded that the design as a whole was mainly attributable to Wilson Worsdell, then a comparatively new member of the staff.

In working order, a Tennant weighed 42 tons 2 cwt, divided into 12 tons 12 cwt on the leading axle, 15 tons 14 cwt on the driving axle and 13 tons 16 cwt on the trailing axle. The tender, full, weighed 32 tons 2 cwt, so that the total weight was 74 tons 4 cwt.

Other useful dimensions are: width over cab sides and rear splashers, 7 ft 1 in.; over the footplating, 8 ft; diameter of boiler clothing, 4 ft 7⅛ in.; and outside diameter of smokebox, 4 ft 11¾ in., its length being 2 ft 7⅛ in. On some of these engines, when new, the safety valves were uncased; but later the entire class acquired handsome, polished brass casings of the shape shown in the drawing. The radius of the cab roof was 16 ft, dropping to the sides by radii of 1 ft.

I have chosen to illustrate No 1478 simply because she was the only one of the class I ever had a run behind, so far as I am aware. One day in May, 1920, when I was stationed in Birmingham, I had to go to Hull to investigate some trouble in lift machines. It was a somewhat tortuous journey; but trips of that sort did not very often come my way, and when they did they were all the more welcome because they usually involved my travelling over railway routes that were new to me. On this occasion I went from New Street, Birmingham, to Leeds via Derby by the Midland Railway, and at Leeds caught a North Eastern train to Hull via Selby.

Returning two days later, I was surprised and delighted to find that the engine from Hull to Leeds was Tennant No 1478. She certainly knew how to run. During the non-stop journey to Selby her speed was well into the middle 70s at several places, but after that we stopped at the principal stations between Selby and Leeds and had no opportunity to indulge in high speed.

I noted that 1478's acceleration with a train of six corridor coaches was very different from what I was more used to behind Stirling 7 ft 4-4-0s on the SECR ! Her work was altogether excellent and particularly pleasing because, at that period, the Tennants had long ceased to be used as main-line express engines and were chiefly employed on secondary passenger trains around York, Darlington and Newcastle. But even on this sort of work they were very good, at least equal to several other and bigger locomotives with which they shared these duties.

Withdrawal of this famous class began in September 1926, the first one to go being, oddly enough, the last one to be built in 1885, No 1506. The entire class had been withdrawn by March 1929; but the pioneer engine, No 1463, withdrawn in August 1927, was saved. She was thoroughly refurbished and repainted at Darlington and then placed in the Railway Museum at York, where she can still be seen, a lasting memento of one of Britain's most celebrated locomotive classes, known and admired far outside their home territory. ▣

HIELAN' LASSIE

By LBSC

Continued from 9 February 1961, pages 175 and 176

Newcomers to live steam will be interested in the safety valves for the 3½ in. gauge Pacific which Thompson rebuilt for the old LNER

CONTINUING the description of the boiler fittings, we come to the safety-valves. In these I have endeavoured to compromise.

Years ago I described a form of semi-pop safety-valve, in which the usual ball was seated in a stepped recess; the valve acted like an ordinary valve under a moderate or steady increase of pressure, but would operate as a pop valve under a sudden increase, giving the requisite amount of outlet to the steam.

These valves always gave satisfaction, and did not prime, as they started to blow off gently before fully opening. I am, therefore, specifying a slight variation of this type for the *Lassie*. If castings are used, first chuck by the hexagon, turn the spigot to ⅜ in. dia. and screw it ⅜ in. × 26, then face the end, and the shoulder of the hexagon. If rod material is used (bronze, gun-metal, or brass) chuck a piece of ⅜ in. hexagon in the three-jaw, face the end, turn down ¼ in. length to ⅜ in. dia., and screw ⅜ in. × 26.

Part off at ½ in. from the shoulder. Reverse and rechuck in a tapped bush held in three-jaw; the procedure is then the same, whether casting or rod material is used. Face the end, centre, drill right through with No 24 drill, open out with 9/32 in. drill, to about ⅜ in. depth, and bottom the hole with a 9/32 in. D-bit to a depth of 7/16 in.; tap the end 5/16 in. × 32 or 40.

Measuring the recess

Now, with a 3/16 in. pin-drill, carefully make a recess 1/16 in. deep at the bottom of the 9/32 in. hole. If any beginner wants to know how he is going to get at the recess to measure it, the easiest way is to put the pin-drill in the tailstock chuck, and feed it into the valve body, with the lathe mandrel stationary, until the cutting edges of the pin-drill hit the bottom of the 9/32 in. hole. Then make a scratch on the tailstock barrel with a scriber, close to the tailstock casting. Start the lathe and turn the hand-wheel of the tailstock. When the scratch is 1/16 in. away from the casting, the recess is all right in the valve body.

Run a 5/32 in. parallel reamer through the remains of the No 24 hole at the bottom of the valve, and turn the outside of the valve body to the shape shown in the sectional illustration.

For the cup and spindle, chuck a piece of 3/16 in. round gunmetal or brass rod in the three-jaw, and turn down a full ⅜ in. length to 3/32 in. dia., slightly rounding the end. Part off at a bare ¼ in. from the end; reverse in chuck, and countersink the cup to take the ball. Centre it lightly, and use a 3/16 in. drill to form the countersink. The cup should be only 3/32 in. in depth.

To make the nipple, chuck a piece of ⅜ in. round brass rod in the three-jaw. Face the end, centre, and drill No 40 for about ⅜ in. depth. Open out to ⅛ in. depth with a 3/16 in. pin-drill, to give a little extra room for the spring. Turn down ¼ in. of the outside to 1/16 in. dia., and screw 5/16 in. × 32 or 40, to fit the valve body. Part off at 3/16 in. from the end, and file four nicks around the edge.

The spring is wound up from 22-gauged tinned steel wire, around a bit of 3/32 in. silver steel held in the three-jaw. Touch the ends on your emery wheel, to square them off. Seat a 3/16 in. rustless steel ball in the reamed hole, by the usual hammer and brass rod method and then assembly the valve as in the illustration.

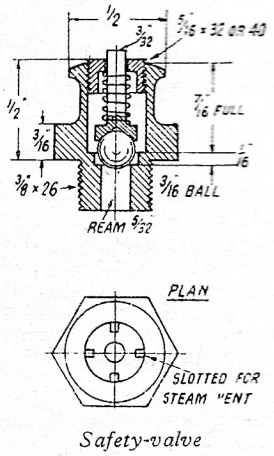
Turret and whistle valve

We come to the combined turret and whistle valve. Chuck a piece of 5/16 in. round bronze, gun-metal or brass in the three-jaw, face the end, and part off a 1 in. length. Rechuck this, centre, and drill right through with a No 43 drill. Open out to about ⅜ in. depth with 3/16 in. drill, and bottom with a 3/16 in. D-bit to ½ in. depth. Countersink the end slightly, tap 7/32 in. × 40 for about ¼ in. down, and skim off any burr. Reverse in the chuck, open out to a full 5/16 in. depth with 3/16 in. drill, then countersink, tap, and skim off burr.

Run a 3/32 in. parallel reamer through the remnant of the No 43 hole. At ¼ in. from the D-bitted end, drill a 5/32 in. hole right across the longitudinal hole, letting the drill come out the other side; midway between them, drill another through one side only, breaking into the longitudinal hole. With this at the bottom, and the D-bitted end to your left, drill another 5/32 in. hole ½ in. away from, and in line with the hole facing you. In this hole, squeeze the spigot of a 7/32 in. × 40 union nipple, as I described for the mechanical lubricator. Each side of the cross-hole has a similar nipple fitted, but screwed ¼ in. × 40. The bottom hole accommodates the fitting which screws into the boiler. Chuck a piece of 5/16 in. round rod in the three-jaw, face the end, and centre and drill down about 7/16 in. with No 40 drill. Turn down 3/16 in. of the end to 3/16 in. dia., and screw 3/16 in. × 40.

Part off at 3/16 in. from the shoulder, reverse in the chuck and turn down 3/32 in. of the end to a tight squeeze fit in the bottom hole of the valve body. Squeeze it in, silver-solder the lot at one heat, pickle, wash off and clean up.

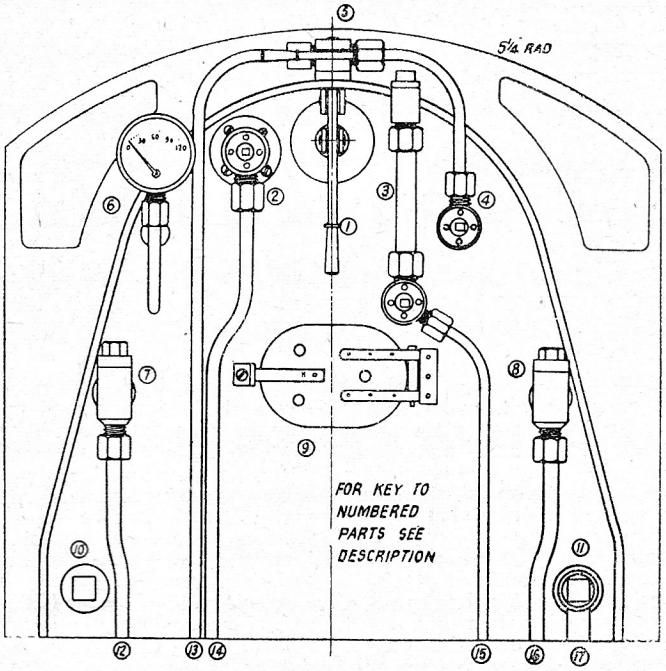
Seat a ⅛ in. ball on the D-bitted and reamed hole, and fit a little hollow cap and spring, as for the upside-down check valves of the mechanical lubricator; see sectional illustration. The plain drilled end carries a nipple with a lever and plunger, to push the ball off its seating and allow steam to pass to the whistle.



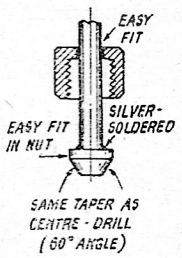
Safety-valve

To make it, chuck a piece of ⅜ in. hexagon brass rod in the three-jaw; face, centre, and drill down about ½ in. with No 51 or 48 drill. Turn down 5/32 in. of the outside to 7/32 in. dia., and screw 7/32 in. × 40. Part off to leave a head ¼ in. long.

File off two opposite corners of the hexagon, so that the head is



Backhead fittings for HIELAN' LASSIE



Union-nut and cone

oblong, and cut a slot a full $\frac{1}{16}$ in. wide and about $\frac{3}{16}$ in. deep, right down the middle by milling, planing, or hacksaw and file. Screw it home in the end of the valve body, and then put a little piece of bronze or brass wire in the hole, 16-gauge for 51 drill hole, or 15 for 48; round off both ends slightly, and let one end just project into the slot, when the other is touching the ball.

The operating lever is a small version of the regulator handle, and so needs no detailing; but note that the flat part should fit easily in the slot, and only one of the corners be rounded off (see illustration) so that the lever cannot fly back right clear of the slot when you release it after blowing the whistle; otherwise the push pin will fly out. I know somebody who forgot all about that, and required a new push pin for every run until he made another lever that stayed put. The lever is pivoted on a piece of domestic blanket-pin pushed through No 56 holes drilled across the end of the slot and through the lever.

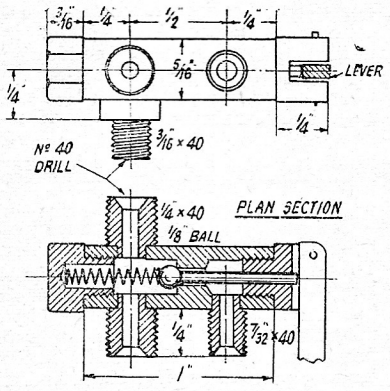
Drill a 5/32 in. hole on top of the crown sheet near the edge, so that it goes right through the backhead flange and gives plenty of hold for the threads; tap it $\frac{3}{16}$ in. × 40, and screw in the turret with a smear of plumbers' jointing on the threads. If the valve does not lie parallel with the centre line of the boiler when screwed home, do not wrench the threads and so strip them, but file a flat across the hole flange.

The nipple on the right-hand side is connected to the nipple on the blower valve by a short piece of $\frac{1}{8}$ in. copper tube with a union nut and coned nipple on each end.

Coned nipples can be made from 7/32 in. copper rod; chuck in three-jaw face, centre, drill down with No 32 drill for about $\frac{1}{2}$ in., chamfer with the ground-off-corner tool, and part off about 1/32 in. from the end of the taper.

That screwed union nipple on the opposite side of the turret to the blower pipe is a spare. Close it temporarily with a blind coned nipple (no hole through it) held in place by a union nut; or use an ordinary coned nipple with $\frac{1}{4}$ in. of $\frac{1}{8}$ in. copper rod silver-soldered into it, the rod projecting through the nut when this is screwed home.

★ *To be continued*



Combined turret and whistle-valve

AROUND THE TRADE

BEAUTIFULLY BUILT TO ORDER

Cherry's of Richmond, Surrey, who make scale model locomotives to order, have just completed two fine examples in 3 in. scale.

A GREAT NORTHERN Ivatt Atlantic class engine and tender was constructed to the order of Mr D. H. Ventura of Ipswich. Although not a steam locomotive, the engine is meticulously built to GN works drawings, and the wheels, motion, inside valve gear and so forth, are free moving.

Mr Ventura is constructing an unusual scenic background, detailed lineside effects, and signals of the period.

The GWR 4-6-0 *King George V* engine and tender were produced from Swindon drawings to the order of Mr S. F. du Pille, managing director of Cherry's. It is a fully working coal-fired four-cylinder locomotive. Great care was taken to get the typical massive appearance so characteristic of the King class.

Each rivet is actual, and in its correct place. The bogie is constructed to the original with the correct traversing motion and mounting, and the Walschaerts conjugative valve gear is correct in all its linkage. High detail work is incorporated in the whole structure. Even the lamps were made to works drawings.

The boiler has two marine type safety valves and two holding-down bolts—not four valves, as often shown in models. Footplate flooring on engine and tender is of planked wood. The tender is fitted with a water pick-up scoop operated from the inclined standard. There is a dummy tender water level indicator, and the toolboxes have padlocks.

Mechanical features include working steam brakes, draincocks on all cylinders operated from the cab, twin axle-driven pumps, injector and automatic lubricator driven from trailing axle. The lubricator is artfully concealed below one of the cab seats.

The engine is finished in the 1927 livery with full lining and detailed hand-painted crest. It is insured for £1,000.

Continued from 23 February 1961, pages 231, 232 and 233

SOME FITTINGS and FALLACIES

EDGAR T. WESTBURY concludes his series

As I have received several queries on fittings such as propeller brackets, stern tubes and engine mountings, and these have an important bearing on the success and efficiency of the finished boat, a few general hints on them will be helpful to constructors.

Stern brackets, which incorporate the outboard bearing for the propeller, need to be very strong and rigid, yet they must be designed to present the minimum water resistance. For this reason the diameter of the bearing housing is limited, and so is the width of the stem. The mounting plate, wherever possible, should be let in flush with the floor of the hull, or attached to the rear face of the transom. A badly designed bracket may set up heavy tail drag, which may cut the speed of the boat by as much as 10 m.p.h., and may also cause erratic running.

While brackets are sometimes made in the form of castings, most of the metals or alloys which can readily be cast are barely strong enough to enable the required fine sections to be used with safety. I once had a bracket cast in phosphor-bronze and highly finished all over, but it bent nearly every time it was used, and eventually broke off at the stem. With modern methods of precision casting it might be possible to get a bracket cast in high tensile steel, which would be highly satisfactory in strength. Ken Hyder tells me that he has machined brackets from solid duralumin, which have stood up very well, as the material is almost equal to mild steel in tensile strength.

Fabricated brackets

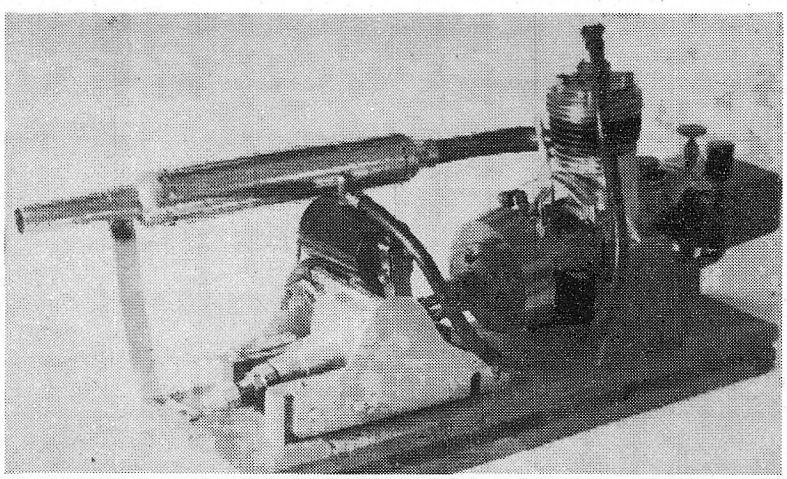
Perhaps the most popular method of making the fittings is by fabricating them from steel; some constructors use carbon steel gauge plate, but I consider that it is somewhat brittle for the purpose. even when annealed. Good quality mild steel should be quite adequate. The stem may with advantage be filed or machined to streamline section before fitting, and the ends may be shaped to form dowels or tongues, to hold it in place in the mounting plate and bearing housing while you are brazing or silver soldering. Strength may be improved by building up fillets at the joints with brazing alloy, or even soft solder, applied afterwards.

Accuracy in angle and alignment are, of course, highly important, and if there is the least risk of the parts shifting or becoming distorted in the brazing operation, it would be worth while to make a jig to locate the relative positions of the bearing housing and mounting plate, at the correct height and thrust line. As it is sometimes found desirable to experiment by varying the thrust angle, the idea of providing means of adjusting it is worth considering. I have made adjustable brackets in the past, but it is difficult to design them so that they do not interfere with either strength or smooth flow lines.

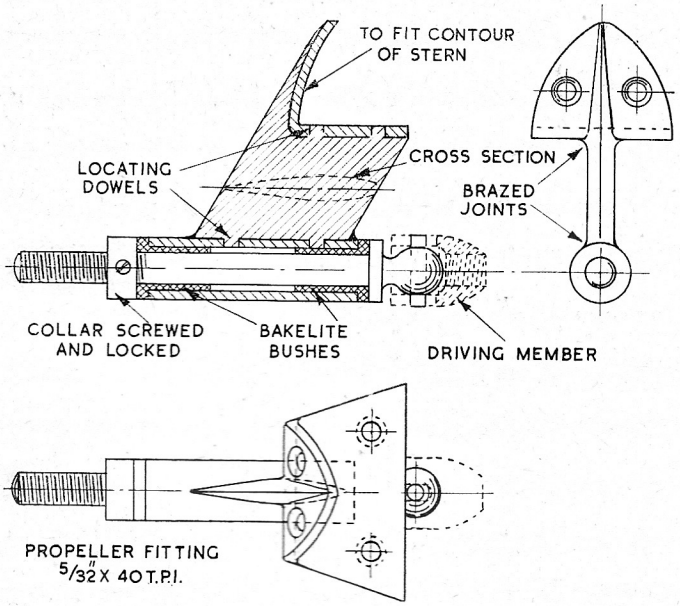
Bearing problems

The propeller shaft bearing not only works in adverse conditions; it also carries heavy end thrust, and because of its small size, one can hardly make it really adequate for its job. In the larger and more powerful boats, ball bearings of the cup and cone type, similar to those used in bicycle hubs, are often employed; but unless elaborate precautions are taken to dry out and oil the bearings each time that they are used, the balls, cups and cones must all be made of stainless steel. Ready-made bearings of the type and size required are not available.

Bushes and thrust washers of fabric-laminated bakelite, such as Tufnol or Paxolin, have given quite good results in the smaller sizes of boats, and there is now a still better material, known as PTFE (or the proprietary name Fluon) which has a very low coefficient of friction, and is self-lubricating. It may be difficult to obtain, and there are risks involved



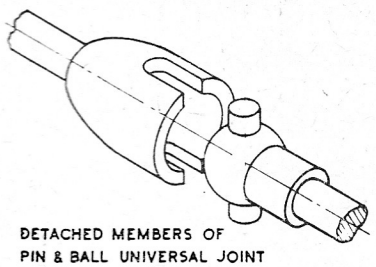
Power plant of COMET, *comprising the* 5 *c.c.* CADET *two-stroke engine and the Atomag Minor magneto*



Stern bracket suitable for COMET *hull*

in machining it, owing to its highly poisonous nature.

A stern bracket suitable for the *Comet* 5 c.c. hull is shown here; as I have already mentioned, the mounting plate here is made in the form of an angle bracket, attached to both the vertical and horizontal faces of the stern block. Wood screws of ample length are used for fixing, and care should be taken to position them so that they do not foul each other.



Stern tube

The tube through which the propeller shaft runs in passing through the hull floor is generally termed the "stern tube," though in a hydroplane it may be quite a good way from the stern. It is desirable that this should give adequate guidance to the slender propeller shaft, which often tries to emulate a skipping-rope—and sometimes succeeds, with disastrous results! At the same time, it must not bind or deflect the shaft, as this may result in considerable waste of power. For this reason, the alignment of the shaft tube is of the utmost importance, and the advantages of the method which I have mentioned of lining up the engine, stern bracket and propeller shaft, while the hull is in skeleton form, may again be emphasised.

I am often asked what kind of gland should be fitted to the stern tube, and the answer to that is—none at all. Even if there should be risk of leakage round the shaft during the short time that the boat is in the water, it certainly will not happen while the boat is in forward motion, as this produces a partial vacuum at the after end of the tube.

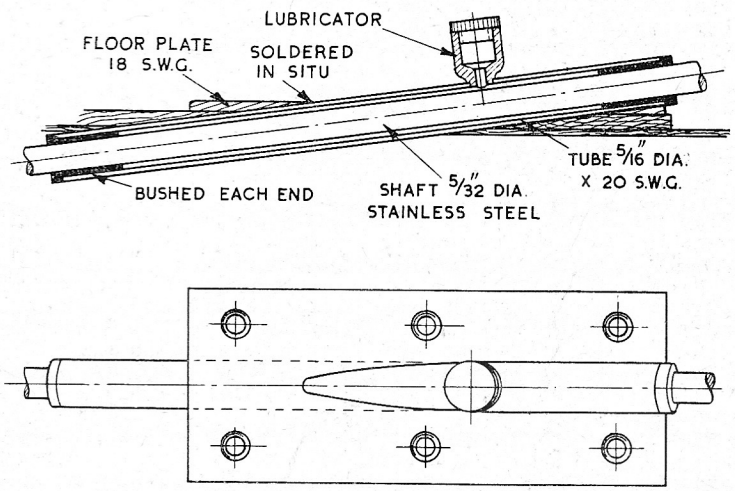
We do not generally want to make the shaft a close bearing fit for the full length of the tube. This may cause binding if any deflection occurs, and so we allow a clearance in the tube, and fit bakelite or PTFE bushes about $\frac{1}{2}$ in. long at each end. Note that plastic material swells when it is soaked in water, and therefore the bushes should be made an easy fit for the shaft. The space between the bushes may be fed with light oil by a lubricator inside the hull.

The simplest way to fix the stern tube in place, after it has been *properly* lined up, is to pack it in with plastic wood. For greater security, a floor plate may be fitted inside the hull, and soldered to the tube in position with a good hot soldering bit.

Hydroplane Steering

A point has arisen on rudders for racing boats. They are generally quite unnecessary and have never been fitted in any of the tethered boats. so far as I can remember. However well streamlined, they must inevitably increase underwater resistance. But it has been suggested to me that they might improve efficiency by *steering* the boat in a circle, and avoid the tugging at the leash which (according to my theorist) wastes a good deal of power.

With all due respect to one who has obviously given the matter serious thought, I believe that this is a fallacy, and that a steady static pull on the line (not a snatch—which is very different!) does not waste power



Stern tube with floor plate mounting and lubricator

any more than the centrifugal pull on a flywheel rim, or a pair of governor weights, in which the urge to escape at a tangent is equally pronounced.

This reminds me that many years ago, when I was first trying, not very successfully, to design hydroplanes, someone who had a claim to expert knowledge told me that in order to run efficiently on a circular course, the hull would need to have a curved keel. I do not know whether he had ever tried to lay out the radius of a 100 yard course (about 47.7 ft) on a boat about 3 ft long; I tried to, and it might just as well have been a straight line for all the effect it had on the running of the boat.

Another fallacy often encountered at the pond side is the theory that a model hydroplane derives some of its lift from the tension in the line. This might be true if the angle of the line caused by the height of its attachment to the pole were sufficient to introduce an appreciable vertical component of force. But in Britain, at least, the height of the pivot is only 15 in., and with a line nearly 50 ft long the lifting force is infinitesimal. In fact, it does not exist at all, as the line is not stretched dead straight; it has a catenary sag owing to its own weight, which takes it below the horizontal at the centre. So far from assisting the boat, the line is a great handicap, because of windage and the power needed to lift it out of the water in starting.

Line drag

Some boats, especially if not adequately powered, have difficulty in lifting the line clear. At high speeds the wind resistance of the line undoubtedly reduces efficiency, but nothing much can be done about it.

Various types of universal joints for the two ends of the propeller shaft have been used, and individual constructors have their own views as to which is best. The need to keep down water resistance limits the size of the tail end joint, so that orthodox types cannot be used. I have always put my faith in the simple ball and pin type, which is easy to make; the weakest part, the pin, can easily be replaced in the event of wear or fracture. The slotted cup should be the driving member, attached to the shaft; it can be more or less effectively streamlined. All wearing parts should be case-hardened; this is better than tempered high-tensile steel in my experience, as this steel, if hard enough to resist wear, is usually too brittle to resist shock. The joint inside the hull can be larger. A proprietary type, such as the Mollart, can be recommended. Screwed shaft joints are generally used, and are quite satisfactory if well fitted, and arranged to tighten in the direction of applied torque.

The reason why the two hull designs selected for inclusion in this series are of a size to take 5 c.c. engines is that 5 c.c. is the largest size of engine at present sold in Britain, and recommended for this purpose. Not only would it be indiscreet for me to give the advice for which I am constantly asked: "Which is the 'best' make of engine on the market?"; it would be impossible to do so, without the opportunity to subject them all to careful tests. It may be said that any make of glow plug or compression-ignition engine from 3.5 to 5 c.c. capacity stands a chance of success in either of these hulls.

For those who wish to build their own engine, two of the well-established ME designs have definite possibilities: the 5 c.c. *Kestrel*, which despite its antiquity is still capable of being tuned to a good turn of speed, and the 5 c.c. *Cadet*, which was produced after the war to follow up the traditions of the previous design. The *Atom Minor* Mark III, being of 6 c.c., is too large for this classification, but it could be adapted, preferably by shortening the stroke.

These engines are all designed for spark ignition, but can be adapted for glow plug.

At present, there are not very many 5 c.c. (D class) boats in existence, but this fact should encourage new recruits to come in and try their hand; it is hoped that such an infusion of new blood will help to liven up regatta events. For those who wish to experiment with their own ideas in hull design, I may mention that the D class imposes no restrictions on shape, size or weight, but only on engine capacity.

Several readers have asked me about rules for larger sizes of racing hydroplanes. The MPBA rules, which hold good for all organised events in Britain, are as follows:

Competition Rule 15.—*Classification of Racing Boats*

Class A—i.c. engines within a limit of 30 c.c., steam-driven boats restricted to an all-on weight of 16 lb.

Class B.—i.c. engines within a limit of 15 c.c. steam-driven boats restricted to an all-on weight of 8 lb.

Class C.—i.c. engines within a limit of 10 c.c., steam-driven boats restricted to an all-on weight of 5 lb.

Class C. (restricted)—i.c. engines within a limit of 10 c.c., fitted with commercially-produced engines.

The Official Retriever

While a great deal more could be writeen about the design of model hydroplanes, I hope that sufficient practical information has been given to enable readers who wish to venture into this fascinating branch of model engineering to grasp the rudiments of design, at least.

These boats are often regarded as freakish and grotesque; but while it may be true to say that they are not models in the commonly accepted sense of the term, they give scope for the highest class of workmanship and ingenuity, and are therefore worthy of attention by all progressive model engineers. In the course of many years' association with all types of models, I have never found any of them more interesting to build, or more thrilling to watch in action, than fast racing boats. Even those exponents who have not been lucky enough to win major prizes will agree with me that their efforts, though falling short of expectations, have been well worth while. Success in any competitive field is always elusive; but rhere is great fun in trying! ▣

"LOR', BUT HER BE A BOOTY"

What was said of Lorna Doone, A. R. DIBBEN says with pride of his 2 in. scale traction engine "Lady Lorna"

Continued from 23 February 1961, pages 228, 229 and 230

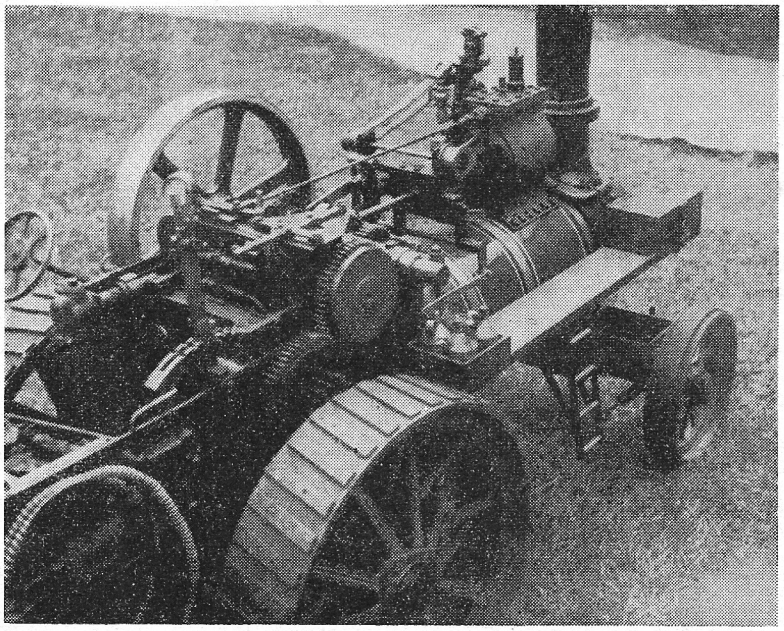
SEVERAL more steaming trials were now carried out, some very successful, some not so good, and others distinctly bad. I still retain the liner in the funnel, for although I am not convinced that it is a necessity, I think that a liner of some sort is beneficial to steaming.

I got better results after I had permanently closed the front damper of the ashpan and cut a long slot in the back. There is no doubt that the best results are obtained from a long flame class of hard coal; anthracite alone is not a success. Most of the bad results occurred when I made the fire burn against the draught; it is no use filling the firebox with wetted charcoal and throwing in a match, as the fire will not burn down but will just flame along the top and may well go out.

"Burn against the draught" is an expression common among users of Lancashire boilers. When one of a range of boilers is cleaned out at a week-end and filled up to half glass with cold water, it will do harm if a fire is kindled in the ordinary way. The method is to light a fire close to the brick arch with fresh coal laid on the bars up to the dead plate.

As the dampers are slightly opened, the fire burns against the draught, heating the water gradually and uniformly. The fire is, of course, tended by the stoker; according to his judgment, he fills in holes in the the fire bed, or pushes the fire forward and feeds fresh coal on the front end. By early morning there is sufficient steam for the boiler to be connected to the range.

Taking the first intermediate shaft gears in hand—the engine has two speeds—I adopted the McLaren idea of a square shaft for the shifting gears, but not the striking forks and handle. My next job was the driving wheels, for which four spiders—each with half a hub—were brought out. As the four rims, like those of the front wheels, were very heavy looking, they had to go to the lathe. The spiders were rather ingenious—of the double pear type, with an odd number



of spokes. With this design, it was only necessary for one pattern to be made for the four castings.

I turned to three long and tedious jobs. Some gears had to be cut with files; 60-odd strakes with four rivets in each had to be fitted to the road wheels, and triangular pieces had to be hacked out of the solid flywheel to make it a spoked one. There was no set programme; I tackled each task as fancy dictated. To relieve the tedium, I brought a portable radio into the workshop. Whether the rhythm and melody were improved by the scrape of the files, the squeal of the hacksaws and the pounding of the riveting hammer, I will not hazard a guess.

Between times I made the second intermediate shaft. It was simple work: a parallel shaft, one gear wheel, one pinion and a collar.

But now a real problem raised its head. For the engine to travel in the forward direction, the valve link had to be in the up position, which was wrong. In steaming trials the links were always down, but the time had arrived for this to be connected. The gear would not function in the up position. When fully up, the lifting arm would not, and could not, remain stationary. It moved from full gear to almost mid-gear twice in every revolution of the crankshaft. I tried lifting arms of different lengths in the hope of curing the trouble, but without avail.

Harbouring nasty thoughts about the ability of the gears designer, I bought drawing paper, found the drawing board, and settled down to designing a layout myself. But the solution was unexpected and simple. Reading MODEL ENGINEER one morning, I came across an article on valve gears. "The open system of rods," I read, "gives an excellent steam distribution." Hastily dropping ME, I went out to the engine and found that the rods were "open." Why not cross them? In ten minutes the job was completed, and the gear worked perfectly both in forward and reverse, as the next steaming test confirmed.

And the links were down in forward gear.

I set to work on the tender. To me a model traction engine tender is a problem. A steel one rusts through, while a copper one is too soft to take serious pulling strains, especially side ones. I had by me sheets of steel and copper too thin to be of use.

Again the subconscious mind came to the rescue with the idea of a steel tender copper lined. I flanged the plates and spot-soldered the copper ones to the steel ones for ease in handling. Altogether five plates were so treated. The whole was riveted up and the result was a rigid, robust tender. Of course, before the footplate (or the water space cover) was riveted in, bits and pieces had to be attached: manhole and cover, injector water cock, drawbar, a fairlead for the wire rope, two steps, brake spindle, filling pouch, and water lifter.

I added a fitting which I had seen on only one engine. Whether this was a works or owner's fitting I do not know; it was an elbow with a gland nut, and a long gauge glass tube open at the top. With it I can easily see the amount of water in the tender, and can dispense with the sounding rod and its funnel on the footplate. I did not like the sounding rod and funnel anyway.

When the footplate had been riveted in, the remaining fairlead bracket, lamp bracket, brake gear bracket, steersman's seat bracket, and the beading round the top were attached.

The steaming trials, after the valve gear had been corrected, were used to try out the first and second intermediate and road wheel shafts. I had heard the expression "screaming gears," but I do not believe that any gears screamed louder than my hand-cut ones did those afternoons. In the course of time they have rubbed the high and rough spots off each other, and they are now comparatively quiet but not exactly noiseless.

The differential gear and brake and winding rope drums were partly machined, and did not need a great amount of work.

They are quite simple, and do not need any comment except that the differential has three pinions.

There were many other jobs that had to be completed, among them the steering wheel, worm and wheel, together with the chains and spring shackle; boiler lagging and brass bands; steam valves and piping for the injector, and the blower and water lifter. I have still to do the strakes pins and cotters, three lamps, an additional gear guard, the tool kit, a tube brush, and respectable-looking firing tools to replace the makeshift ones now in use. There are also the problems of the drain-cocks and top feeds.

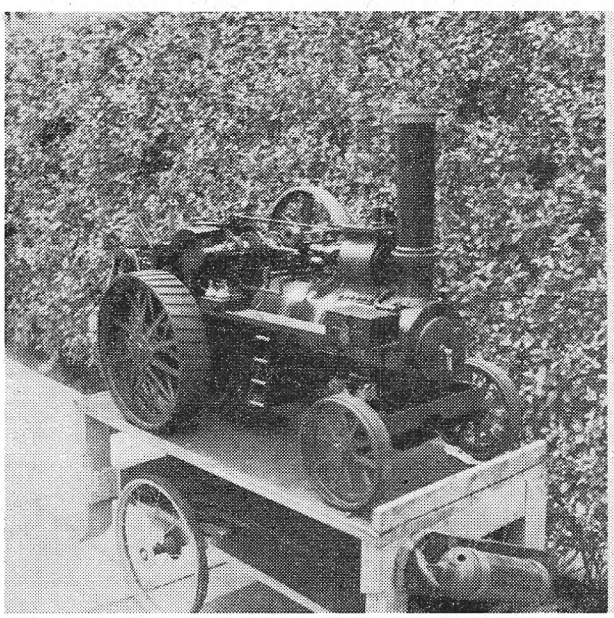
With driving pins for the road wheels made and fitted, *Lady Lorna* was now on four wheels and ready for the road. Before being allowed out, she was enamelled maroon on the boiler and tender, with red wheels and lining of black, yellow and red. All her brass work was polished. With her nameplate on the smokebox, she sallied forth under her own power. What a transformation from the grubby heap of untidiness and shapelessness which she had been when I first saw her!

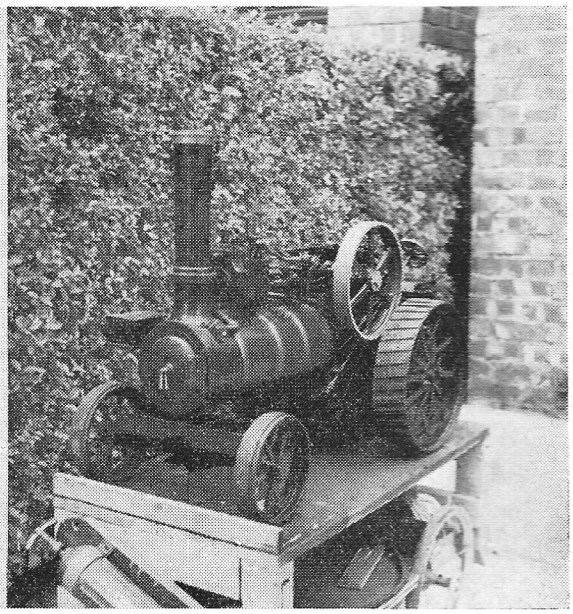
I was now able to sniff the incomparable odour of warm oil and burning Welsh coal; a smell which she could exude as only traction engines can. She has been out many times since, collecting many interested spectators, young and old. But she will never win a prize in a model engineer competition.

Owing to her being an outdoor engine, some steel parts have been given a coat of aluminium paint, which does not look quite right, but is infinitely preferable to rust. It is, I suppose, only to be expected that the younger spectators should ask, "What is it?"—just look at her now; note the saucy rake of the funnel and those curves of the tender. "Lor', but her be a booty," as someone says of Lorna Doone.

Her vital statistics are 38-26-38 (length, width and height). Her road wheels are 12 in. × 2¾ in., her steering wheels 7½ in. × 1½ in. and her flywheel 9 in. × 1½ in.

I have a motor car dynamo to which I fitted a pulley, so that when I get the chance and the evening weather is fair, I give L.L. the task with the

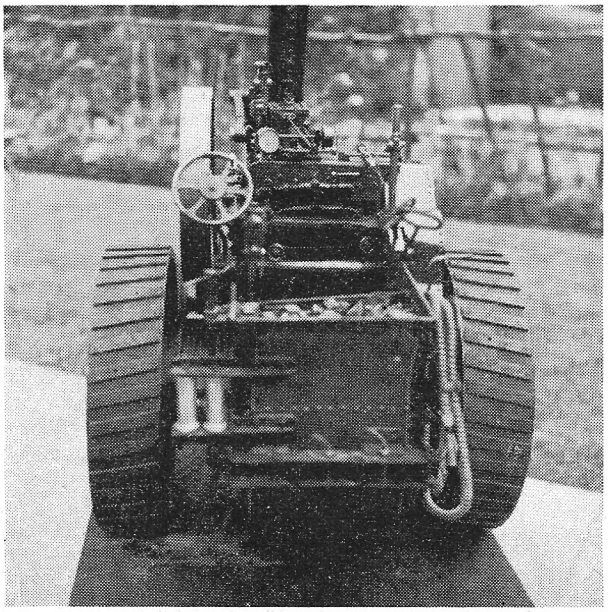




aid of a long driving belt, of generating electricity. I use two methods of steam maintenance: one the constant water level, the other the constant pressure. The first I use if there is a visitor; I set the return water cock on the pump to ensure that the water is always half-glass, but, of course, the pressure fluctuates as the fire is tended and then burns through. Constant pressure is more difficult, but infinitely more interesting. Beginning with half glass of water, a bright fire, and pressure just under blowing-off point, I close the return water cock. When the time comes for the fire to be replenished, the water is (or should be) three-quarter glass, so that the return cock can be opened. As the fire burns through, the cock is progressively closed.

My aim is to keep the pressure constant, but I must confess that I am not generally successful. While I am so engaged, amusing thoughts cross my mind. Am I a cruel task-master thrashing a beautiful willing slave, or is she a haughty insufferable beauty demanding undivided attention, the best of food and the purest of drink before she will condescend to be gracious? Perhaps we are buddies quite content with doing things for each other.

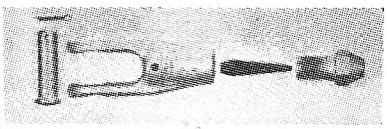
With these queries still unsolved, I hear that the family have returned and that supper will be ready in about ten minutes; and so there is just time to slip the belt and let her tick over with the return water cock shut. The fire soon blacks out, and the funnel



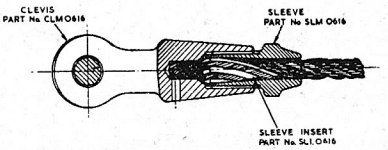
cap is put on. I freely admit that it is not polite to say so, but she is now a filthy madam, having mantled herself in a cloak of light grey ash which has been raining down from the funnel top and in places has mingled with drops of water and blobs of oil to assume a darker hue. The worst is wiped off and the water-proof sheet tied down for the night.

Next day *Lady Lorna* is moved into the beauty parlour, cleaned, and rubbed with a well-known brand of motor car polish. Is this the correct thing to use on a traction engine? She does not object and so she is tucked up again until I carefully pull off the covers and bid her awake a day or two later.

I love all traction engines, but in spite of (or is it because of?) her obscure ancestry, and her feminine traits, my first favourite is now *Lady Lorna*. ▣



WIRE ROPE TERMINALS



TULLACH'S wire rope terminals have been designed as attachments to wire ropes of any known specification. They can be quickly fitted on site, with a few simple tools and unskilled labour, and without any heating or degreasing.

As shown in the illustration, the assembly consists of a sleeve, to accommodate wire rope of given size and diameter, a grooved and tapered plug, which is inserted to separate and hold the strands of the wire rope, and a terminal head.

The sleeve and terminal head are made of forged steel.

To fit the terminal, the end of the rope, from which a short length of core has been removed, is passed through the sleeve, and the plug is driven into the centre of the rope where it passes through the sleeve, each strand being laid in a groove in the plug. The ends of the strands are then inserted in the terminal head, which is screwed into the sleeve. The screwing action re-lays the wire above the plug, so that the wire cannot be withdrawn.

In the terminal head there is an inspection hole, through which the twist of wire should show; it allows the operator to check that sufficient wire has been inserted to ensure absolute safety in use. The terminal locks the wire rope to the assembly, forming a connection which cannot come apart. The strength of the attachment is greater than that of the wire rope, and is capable of withstanding any hammering, vibration or other industrial hazard.

The address of the Tullach Construction Ltd, is 3 Bridge Place, Sutton, Surrey.

READERS' QUERIES

DO NOT FORGET THE QUERY COUPON ON THE LAST PAGE OF THIS ISSUE

This free advice service is open to all readers. Queries must be of a practical nature on subjects within the scope of this journal. The replies published are extracts from fuller replies sent through the post: queries must not be sent with any other communications: valuations of models, or advice on selling cannot be given. stamped addressed envelope with each query: Mark envelope clearly "Query," Model Engineer, 19-20 Noel Street, London W1.

Grasshoppers

I hear that you once published in ME details of the Grasshopper engine. Can you tell me the year and date ?—F.S., Herne Bay, Kent.

▲ *You will be interested in an elevation and plan of a typical beam engine by H. Muncaster, 27 June, 1957, and drawings and photographs of the Grasshopper made by Easton and Amos and modelled by Ebeltoft, Norway, 31 March, 1949.*

Chromium plating brass

Can you please tell me what firm would chromium plate four pieces of brass bar 5 in. × ½ in. × ⅛ in. thick ?

Trusting the staff are in good health and with many thanks for past favours. —R.L.A., King's Lynn, Norfolk.

▲ *It should be possible to have chromium plating done through your local cycle shop. Work of this kind is undertaken by the King's Cross and Atwood Plating and Enamelling Company, 25A Pentonville Road, London N1.*

Keeping the engine smart

I have a Fowler steam roller which is used only for rallies and private steaming, and as I must store the engine some distance from home, my problem is how to keep bright steel bright and the brasswork reasonable.

Could you recommend a varnish or lacquer for bright steel and brass work ? Some parts get fairly warm.

The paintwork is fairly good, and original, and I want to try and preserve the original paint and lining. Could you recommend a suitable product for cleaning the not-too-thick oil and soot that is on the paint now ?—G.R.H., Reading, Berkshire.

▲ *You should use a lacquer specially designed for use on metal. It would certainly be suitable for the brass work, though on the steel working parts the presence of oil may make it difficult to keep in good condition.*

A preparation such as Shell Ensis oil would probably be found satisfactory. Suitable lacquers for metal work are obtainable from W. Canning and Co. Ltd, St Johns Street, Clerkenwell. Applied properly, they should stand the heat of parts subjected to steam. Any good oil varnish should be suitable for preserving the original paintwork. All traces of grease should be removed before applying it, by the use of a detergent and by thorough washing in clean water. On paintwork it would be advisable to rub down lightly with pumice powder before varnishing.

Apron for BGSC

For the past eighteen months I have been using a 3½ in. B.G.S.C. flat bed lathe of unknown origin. It has served me well, but as it is has no rack and pinion traverse the leadscrew is becoming worn over the middle part and will soon need replacing.

Before replacing it, I would like to fit a rack and pinion drive and split-nut apron. Is it possible to obtain castings or constructional data for a suitable apron, please ? The present apron is virtually an angle plate bolted to the underside of the cross-slide, and not an integral part of it.

May I say how much I enjoy ME and the variety of contents each week ? —I.B.B., St Ives, Huntingdon.

▲ *There seems to be no one who could supply castings and drawings for a suitable apron to include fittings for a rack feed.*

It might be possible to adapt the apron of an existing type of lathe such as that of the Portass or Myford 3½ in. The apron is not normally made as an integral part of the saddle but is bolted either to the front edge or the underside, as you suggest.

Wife wants lamp

Who would supply me with sufficient ⅛ in. × ⅜ in.—½ in. flat metal to make a standard lamp ? My wife has decided that she wants one made of scrolled metal.—J.W.B., Wolverhampton.

▲ *Presumably black wrought iron would be the material employed. You may get it from a local blacksmith; it is not used very much in engineering at the present time.*

It would be quite possible to use mild steel, which is a more expensive metal. It can be obtained from A. J. Reeves, 416 Moseley Road, Birmingham 12. The methods of bending and working either material would be much the same.

Steam car for the prairie

As a locomotive engineer, I am fully aware of the potential of steam as motive power for an automobile. I am interested in building such a car, but I need some technical advice, and assistance. Would you know of any books or publications ?—R.M.W., Winnipeg.

▲ *You should get in touch with the editor of* Light Steam Power, *Mr J. Walton, Craig View, Cannan Avenue, Kirk Michael, Isle of Man, or with the secretary of the British Light Steam Power Society, Mr Robert G. Davis, Lindum, 309 Arundel Street, Portsmouth, Hampshire.*

Marine boiler

One of our club members is constructing your *Trident Major* internal flue marine boiler from your plans. He wants to know if bright steel staybolts could be used instead of phosphor bronze, please ?—A.O.P., Gravesend, Kent.

▲ *Bright steel is not recommended for the staybolts. There would be a great danger of setting up electrolytic action between the two metals in the presence of any acid or other active chemical in the water.*

Staybolts of bright steel are, of course, quite satisfactory in steel boilers so long as normal precautions to prevent corrosion are taken.

Britannia firebox

I am constructing a 3½ in. gauge *Britannia*. I understand that the smokebox should be a push-on fit on to the smokebox tubeplate. As the weight of the full boiler is taken between the smokebox saddle and the backend, surely this will give an undue stress on this joint by sagging ?

Is it sufficient to make the front smokebox ring a tight fit in the smokebox or should it be held by screws ?

How is the dome cover held to the boiler barrel ? Am I right in thinking that all the piping is in 5/32 in. ×

26-gauge tubing ?—E.D., Thorpe Satchville, Leicestershire.

▲ *A row of screws about 8 BA around the joint between smokebox and boiler barrel.*

Some builders rely on a tight push fit for the smokebox front ring in the smokebox. If screws are used, 6 or 8 BA should be ample.

LBSC does not show on his drawings how it is intended to fit the dome cover. If you are using the smokebox regulator, a small screw could be used, put into a tapped hole in the centre of the inner dome cover. If you are using the slide valve regulator, the small screw shown should not be used. Open out the hole to, say, 7/32 in., tap ¼ in. × 40-t., and fit a shallow-headed plug threaded externally ¼ in. × 40-t. This can then be drilled and tapped centrally 6 or 8 BA to take the screw holding the outer dome cover.

All piping is 5/32 in. o.d. thin-walled, except for the blow-down, which is 3/16 in.

MODEL ENGINEER EXHIBITION

The next Model Engineer Exhibition will be held at the Central Hall, Westminster, opposite Westminster Abbey, from 16-26 August 1961, excluding Sunday. An announcement about entry forms will be made later.

Crackle enamel

I should like to know where I can get a small quantity of black crackle enamel. It is to be used on aluminium, brass and mild steel.—P.F.P., Shaftesbury, Dorset.

▲ *A small quantity of black crackle enamel is obtainable from Gedge and Co. Ltd, 88 St John Street, London EC1.*

Motor for miller

I have just come into possession of a small vertical miller. What horse-power do I need to drive it ?

It has a 1 h.p. three-phase, 440 v. motor. This is no good to me, as I am on single-phase, 230 v. supply. The motor is carried on a swinging cradle with a three-step flat pulley driving a countershaft on the back.

The capacity is ½ in. dia. end mills; the table is 18 in. × 5 in. wide. Head bearings and pulley bearings are bronze. The makers are G. Taylor and Son, Coventry.

I have had experience of this machine. We have one in the toolroom where I work. This one has a ¾ h.p. motor. It still seems overpowered. I need it for 5 in. gauge locomotive work.—H.L.A., Yardley, Birmingham.

▲ *It is, as you suggest, very likely that the machine will run on considerably less than 1 h.p., but a great deal will depend on the duty for which it is required.*

A ½ h.p. split-phase induction motor should be quite satisfactory, so long as the machine is not required to start under cutting load.

Clock dial

I have made a clock dial on which the thick strokes are cut through the plate (16-gauge) and the thin strokes are engraved. I am at a more or less complete loss to know what is a suitable material for filling. I have had samples of Quickfyl, but the makers say that it is suitable only for fine engraving. There is also Quikfilla, but I gather that it has to be filed over after setting which would not help the dial !

Can you suggest any material ?—W.J.H., Tralee, Co. Kerry.

▲ *Quikfyl should be a satisfactory material if the pierced dial is backed up either by metal, which could be soldered in position, or by plastic material, cemented thereto.*

Fusible enamels are sometimes used to fill in pierced dials, but they need to be applied at high temperature, which presumably would not be convenient.

Miniature projector

When I recently took up colour photography, I needed a projector for 35 mm. transparencies. As I like making things myself, I naturally looked through back numbers of ME for a design, and was delighted to find the articles by Kinemette from 16 April 1959.

I collected materials and lenses. The only suitable lamp had the filament set rather low down, and to avoid having an excessively tall lampholder, I decided to set the optical centre 1½ in. lower than the design showed. This meant redrawing, and in the process I saw that things were not adding up properly. I thought at first that the design must have been only a drawing-board one, but the photographs in the article disproved this, though they did not show the projector with the cover on.

Reference to the drawings shows that the width of the inner casing at the height of the optical centre is 2¾ in., while the width inside the outer casing is just 3½ in. Yet the plate holding the 2½ in. dia. heat filter is 3½ in. wide at the same height, and for a further ½ in. above it. The diameter of the condenser mount is 3¼ in.

I should like to know how the casing goes on, as 3½ (or 3¼) into 2¾ simply will not go ! Unless my calculations are hopelessly wrong, it seems to me that the heat filter will not even go inside the outer casing.

Even if the sides were vertical (as I shall have to make mine) the width inside the inner casing would be a bare 3¼ in., and again 3½ will not go in.

A reminder that the chassis should be earthed would have been wise, as it is a point that can easily be missed, and all constructors are not electrical engineers. It is more than likely that some would connect the instrument by ordinary lighting flex to a lamp socket.—M.H.D., Blandford Forum, Dorset.

▲ *There is an error in the detail drawing of the filter carrier, apparently because the filter specified was larger than the original available.*

As you are redesigning the projector, this should not be very much trouble; you will be able to adapt the details to the new dimensions of the casing.

ME is always concerned with safety precautions in all types of instruments and working models, but it is a fact that a very large number of projectors and other items of electrical equipment could be operated quite safely from a bayonet lamp socket. Contrary to popular opinion, earthing this equipment does not confer complete safety of operation unless the condition of wiring and other installations is kept in perfect order.

These will be saved . . . *continued*

Where will the engines be stored ? It seems as if many of them are to enter museums where they will never touch the rails again. Some think that British Railways should select a site approximately in the middle of the country and build a museum there. Others would like the museum in London.

Still better—but this, I fear, is only a dream—would be a number of smaller museums scattered about the country, each with rail access and with a short line on which locomotives could be run.

The exhibits could then be circulated between the museums, giving people in all parts of the country a chance to see them.

But whatever we feel we must agree that the British Transport Commission should be congratulated for its forethought in arranging the preservation so far in advance. ▣

POSTBAG

The Editor welcomes letters for these columns. A PM Book Voucher for 10s. 6d. will be paid for each picture printed. Letters may be condensed or edited

OVERFLOW PROBLEM

SIR,—You may be interested to hear that my "wandering lathe" [Postbag of 19 March 1958] is once again stripped to the bones and boxed for its next journey, to Herford in Germany.

I note that A.G.M. of Glamorgan [Postbag, 29 December 1960] is having trouble with water running out of his radiator overflow pipe, now that he has fitted a heater. Surely the answer is simply to attach a length of tubing to the overflow pipe, and arrange that its open end is higher than the highest point of the heater pipe, when the bus is in its attitude of maximum gradient ? Much easier than safety valves and hydraulic tests ?

Anyway, I'm sure we all get a lot of fun out of wrestling with other people's problems, probably because we are not faced with the necessity of putting our ideas into practice !

I have read my MODEL ENGINEERS from cover to cover ever since I "discovered" a copy on an Indian bookstall in Singapore. I have also, from time to time, taken other magazines of like kind, but none have "stuck" like ME—tribute enough to the standard of your product.

On the subject of the work of Martin Evans, for which I have unreserved admiration—I recently received (via Father Christmas) a copy of *The Manual of Model Steam Locomotive Construction*. I think it is a most excellent book, of great practical use as well as of interest when, for one reason or another, the workshop is not available. It is a pity though that the drawings are not all to the same high standard.

For all this I thank you, and you may count on my continued support.

13 Signal Regt, E. R. ADDINGTON.
BFPO 53. (*Lieut.*)

WICKLOW LATHE

SIR,—I have a lathe made by Sheane Brothers, toolmakers of Wicklow. I have heard that Sheane lathes were made for the British Army during the first world war. How true this is I do not know.

My lathe is 18 in. between centres and 4½ in. swing over bed, with gap and screwcutting gear. Although it is pretty old, it runs well except for a rumble when it is screwcutting, owing to wear in the gears.

If any more Sheane lathes are working, I would like to hear about them.

I was introduced to ME three years ago when I was working with De Havilland Aircraft at Hatfield, Hertfordshire, and I have been a regular reader ever since. I find ME extremely good value.

Dundalk, G. CAMPBELL.
Republic of Ireland.

MORE MEMORIES

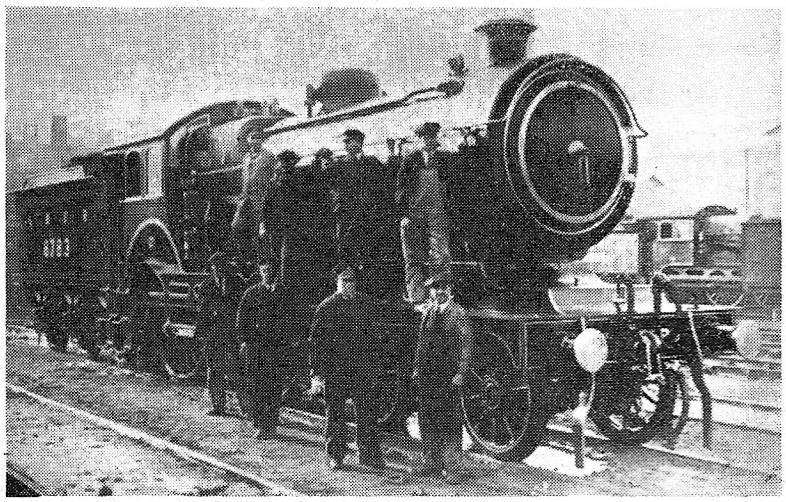
SIR,—I have a photograph which I think will bring back memories to J. P. McKenna [Postbag, January 19] and others.

It is a picture of the Great Eastern royal engine and was taken when the late Mr Day had completed 25 years as the royal fitter. He is next to the driver, and the young man who stands on the footplate above him is his son (now one of our head fitter foremen). At Liverpool Street Station last summer a passenger who turned out to be the daughter of the driver, Fred Peart, told me that he was still about, at an age of over 84.

The royal engine was a beauty and she never fell down. Our governor, the late L. P. Parker, would come out of his office to look at her as she shone in the sunlight. She had apple green paintwork and white lines, brass chimney and belly bands, delivery pipes, whistle, valves and clack boxes. Oh, the scouring ! We used sheets of coarse and fine emery paper—no aluminium paint. It was all elbow grease in those days. Although our arms ached, we competed with one another to see who could make his side shine the more.

Yes, McKenna saw her go through Brimsdown. She was on the Cambridge and Southend runs when she was not doing royals, which were many in those days. As Robin Orchard said in ME of October 13, 2613 has now gone with the good and bad Clauds. She was burnt up in the old foundry at Stratford about two weeks ago.

Canning Town, C. C. YELVERTON.
London.



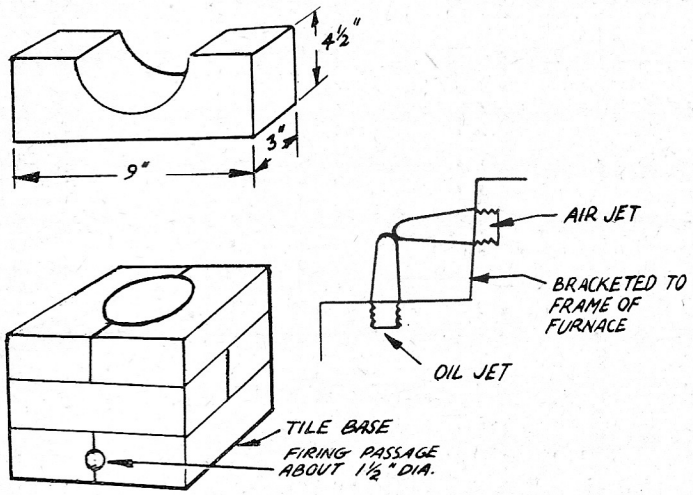
Royal engine of the Great Eastern. C. C. Yelverton says that Mr Day—next to Driver Peart—had just completed 25 years as royal fitter

NO GAS

SIR,—I was faced with a heating problem similar to D.F.C.'s [Queries, October 20] when I was employed at a hastily-built and inadequately serviced factory during the war. A furnace capable of melting about four pounds of bronze, or an equal buik of aluminium, was needed in a room where no gas was laid on, and the electrician would let us have only that time from the original lighting up. Aluminium took about 12 minutes.

Although I never tried it, I feel pretty certain that a five-pint blowlamp would serve to heat the furnace for aluminium, but I would not be too sure about melting bronze by this means.

Silverdale, Lancashire. W. S. CARTER.



How a reader in Lancashire tackled the problem of a furnace without gas

5 amps on the single-phase for all purposes. An oil-fired furnace was decided upon, constructed from standard 9 in. × 4½ in. × 3 in. firebricks cut as in one of the illustrations.

Six bricks were treated, and assembled in a frame welded up from angle iron (old bedstead to be exact). A 9 in. × 9 in. × 1½ in. tile formed a base. I jointed the bricks with fire cement, bought over the counter at an ironmonger's.

The burner consisted of two scrap welders' tips, whose sizes I forget, and the oil level was maintained about ⅛ in. below the fuel jet by a float chamber from an old motor-cycle carburettor.

A ⅛ h.p. blower gave more than enough air to spray the oil, and once the furnace was started on paraffin it would run all day on waste cutting oil that drained from the machine-shop swarf.

The top of the furnace was closed with a few pieces of broken tile when it was in use. We found it worth while to put a bit in the bottom of the furnace, to support the crucible and allow the flames to play on the base.

A four-pound melt of bronze could be poured after 20 minutes with the furnace hot, or after about twice

GREEN LIVERY

SIR,—One, at least, of the GCR 4-6-0s was painted green in 1939-40 so that the official policy [Postbag, 15 December 1960] must have changed at some time during the mid-Thirties. This engine was 6167, shown in the official photograph after the June 1938 rebuilding as being painted green.

I saw 6167 in the winter of 1941, as far as I remember, very dirty but still recognisably green. I remember being disappointed that it was not named ! It was at the head of several London Transport Central Line cars, presumably from the Ruislip depot. The explanation of the colour may be that only the rebuilds were painted green.

I would like to support Mr Sutton in his plea for the post-grouping classes. What about the S1/3 and U1 ?

Leatherhead. R. M. HALL.

GRESLEY PACIFIC

SIR,—May I be permitted to give my views and recommendations to W.R.B., Henlow Camp, Bedfordshire [Queries, January 26], in the light of my work and experience in modelling Gresley Pacifics ?

I consider ¾ in. scale to be just the thing for building an A4. Do not use a *Hielan' Lassie* boiler shortened, but refer to Clarkson's drawings of his A3 Pacific. His boiler would suit the A4 without modification, and would be of the right shape and size. The valve gear and motion as shown on the Clarkson A3 drawings should be suitable for an A4 in every way.

The prototype inside cylinder inclination is 7 deg. 8 min., but on the A3 drawings is at 5 deg. 34 min. (1 in. in 10¼ in.) and this means that the cranks would be set at 120 deg., 114 deg. 26 min. and 125 deg. 34 min. which is all to the advantage of the engine, as the valve gear, of course, gives a 120 deg. setting, and the less the angle, the better it is for the middle cylinder's normal working.

The cylinder bore and stroke should be 1 3/16 in. × 1⅝ in. for all three.

Ringwood, Hampshire. JAMES PERRIER.

SUNNY BANK

SIR,—I was much interested in the article by Arnold Throp [ME 22 December 1960] on the engine at Sunny Bank Mill, Helmshore.

It seems that the original parts of the engine are the work of S. S. Stott of Haslingden who fitted the Corliss h.p. engine. The crosshead slippers are rather unusual for a Lancashire mill engine, as most engine builders, although they used the widely-spaced slippers, did not fit a top guide bar, but only a very narrow keep-plate held by setscrews. The type with the top guide bar was fitted by S. S. Stott, and also by Ashton and Frost of Blackburn, and Roberts of Preston.

The l.p. eccentric strap also follows early Stott practice, and is very similar to the one on an 1881 engine at Plantation Mill, Haslingden; this engine also has a top guide bar (the later ones by Stott's had a single slipper).

Sunny Bank engine has a main bearing of exactly the same type as the one at Plantation, and the same as the one on the horizontal 1884 Stott at Martin Mill, Norden. The radiused edges of the crank web are identical to those at Martin Mill.

Another rather unusual feature is the large round sight-feed oiler on the main bearing. Most makers fitted a large rectangular " aquarium." The method of driving the indicator gear, although unusual, was introduced on some of the engines by J. & W. McNaught of Rochdale, who also took the drive from the air pump trunnion.

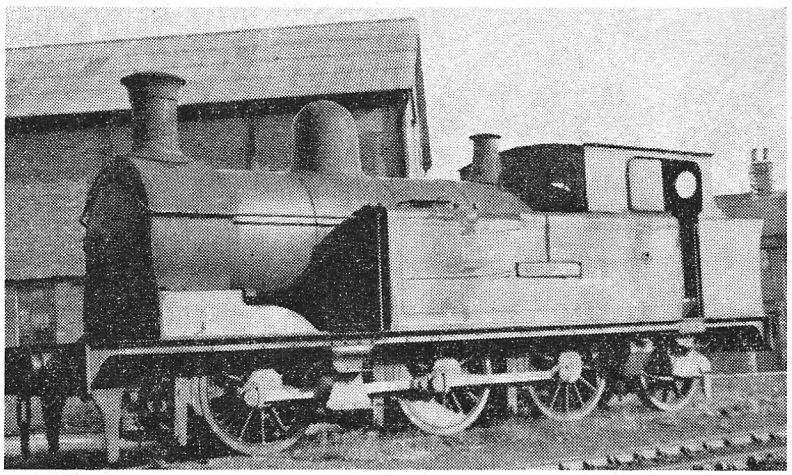
The governor follows later Stott practice and is identical, except for the compensator, to the one at Butterworths of Waterfoot (1914). Lumbs of Elland obviously made the compensator. The type of long slide

valve chest was very popular with most makers in the early days. The rectangular cover over the jackshaft is unusual. Covers were generally round, or quite often the shaft was left bare. It is a great pity that these fine old engines are being replaced with electric motors. Hardly a week goes by but I hear that another engine has stopped for the last time.
Royton, Lancs. T. LEES.

KIRTLEYS ?

SIR,—I saw an old NCB tank locomotive rusting in a siding last year. It was evidently destined for scrap, as the sand pipes and some of the brake gear had been removed.

The engine had worked up to the end of 1959, and had obviously seen better days, as it had a faded green livery which had been lined.



" Could it possibly be one of William Kirtley's engines? " asks E. H. Jeynes who saw this National Coal Board tank rusting in a siding. William Kirtley (not to be confused with Matthew of the Midland, who worked as a boy of 13 on the Stockton and Darlington) adopted the 4-4-0 *on the Chatham in* 1877

It will be noticed that it greatly resembles the old LCD 0-6-0 tank engines described by D. L. Bradley in his article " Ten Tough Little Shunting Engines for Modelling," on 17 December 1959. Could it possibly be one of William Kirtley's passenger engines ?

The safety valve casing reminds me of the old Midland Railway.
Newcastle-on-Tyne. E. H. JEYNES.

FOR SOUTH AFRICA

SIR,—You will no doubt be interested to hear of some of the progress being made by model engineering in South Africa.

One of the great steps forward, and a milestone in the history of model engineering in this country, will be the first South African National Model Boat Regatta. The meeting is being organised by Bloemfontein MES with the closest co-operation from all the other model clubs in the country. It is to be held on the Round Pond, Kings Park, Bloemfontein, and the provisional dates are from the 2-4 September, 1961 inclusive.

Our intention is to hold all types of competitions for power boats, free-running and radio-controlled; for yachts of 36 in., M and A classes; and for scale model sailing ships. Trophies and prizes will be awarded. We should have at least 40 boats present if all who want to attend can be there.

The difficulty is the great distances which have to be covered to get to a meeting. Our nearest club is over 250 miles away and the others are at distances up to over 600 miles. But everyone is so very keen that the distances do not seem to bother them.

As well as getting great pleasure from such a meeting, we hope to interest a great many of our youth in an objective and constructive hobby. A large proportion of our members are juniors. They are doing excellent work and we expect great things from them in the future.

I would like to extend to any visitors from other countries a cordial invitation to attend and take part in our first National Model Boat Regatta. They can be assured of a warm welcome and happy stay; South African model engineers are among the most friendly and hospitable that I have met anywhere.

Thanking you for the excellent magazine which you continue to produce for us,
Hon. Secretary, F. W. BISHOP.
Bloemfontein MES.

STAINLESS STEEL

SIR,—Mr J. Davies [Postbag, 22 December 1960] raises some interesting points for the ordinary man trapped in the stainless steel maze, and I hope that I can help him.

Probably nine-tenths of us in the modelling world obtain our supplies of stainless bar stock for piston and valve rods and boiler screws over the counter of the retail trade. It should be remembered that, in addition to other desirable qualities, this material has to be reasonably free cutting, otherwise we could all be in trouble with screw work. I feel sure that if Mr Davies carries out his intention of removing and examining the parts, he will find them in good condition, as the applications are not severe.

As for the boiler blow down valves, the evidence seems to show that they have been used at a relatively high pressure, instead of the few p.s.i. for which they were intended. One of the most strenuous conditions to which a small valve can be subjected is a high pressure drop across the seating. If the blow-down valve is used with a boiler pressure of 60 p.s.i. discharging to atmosphere, any sediment and so forth present in the lower water space will be jet propelled across the seating by the pressure drop.

This will result, in a short time, in erosion and cavitation of the taper, which Mr Davies reasonably enough describes as " corroded away." A cure could be effected by employing specification 18-10-3 stainless steel, which can be comfortably machined, is readily obtainable, and is suitable in this application for pressure drops of up to 75 p.s.i.g. steam, and 150. p.s.i.g. water.
Maidstone, M. W. MCGRATH.
Kent.

SIR,—I must join in Jack Davies's concern [Postbag, 22 December 1960] about the use of so-called stainless steel in boiler work. Both my *Petrolea* and *Ada* have had blower troubles, traced to corroded valve stems. My *Molly* has not had trouble, as the valve stem was made (in 1945) from drawn bronze bar.

I have found that drawn bronze is quite suitable for valve stems in blowers and injector steam valves. Steel to BS Specification S.80 is reliable in non-corrosive properties, if you can get it ! I doubt if titanium is a commercial article. Why not continue with drawn bronze bar ?
Yeovil, J. B. ESCRITT.
Somerset.

CLUB NEWS

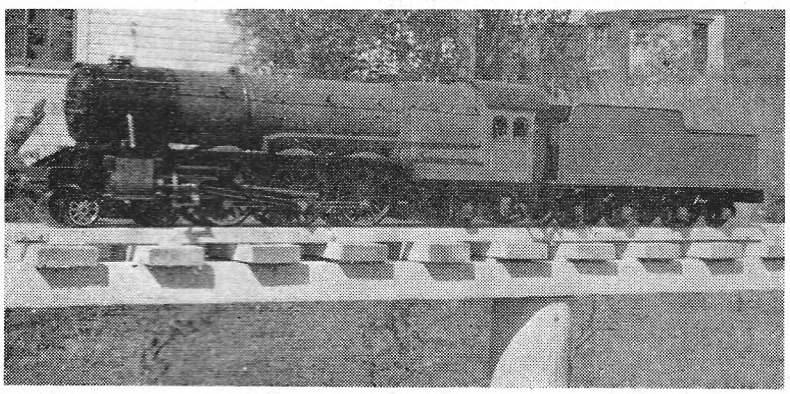
Send news and notices to The CLUBMAN, 19-20 Noel Street, London, W1.

WINSBY WALKER

RECENTLY I mentioned that Mr Winsby Walker of Moreton, New Brunswick, was carrying out some experiments in haulage with model locomotives. I have since heard from a friend of his, Mr J. F. Bush of Carpenders Park, Hertfordshire, that he has died.

The picture on this page shows Mr Walker's last model, a freelance Pacific. It was completed shortly before his death.

" He was a very fine model locomotive engineer," writes Mr Bush, " and despite the fact that he was with the Canadian National Railway for many years until his retirement at the end of 1959, he always preferred to build British locomotives."



His wife has the sympathies of the model engineering movement.

CROYDON REVIVES

Mr E. R. Van Cooten tells me that the Croydon club is now in a much healthier state. It has everything organised and has found a site for a permanent multi-gauge track on which work has already begun.

A full list of events has been drawn up for 1961. The members meet at the clubroom every Monday for a discussion, and on one evening a month they have a talk or film show. They are also planning visits to establishments of interest such as the huge Croydon B Power Station, a local brickworks at Woodside, and two of the steam-operated waterworks in the area.

Anyone interested in joining should write to Mr Van Cooten at 142 Purley Downs Road, Sanderstead, Surrey or go along to the Lindfield Club, Lindfield Road, East Croydon on any Monday night.

HARLOW READY

Members of Harlow SME have been overhauling the portable track in readiness for a busy summer season. The rails have been cleaned of all traces of rust and have been spray painted to preserve the metal.

Overhaul of the track is a very important task for every club and one which is often neglected until a day or two before the track is supposed to open for another season.

Not all the recent meetings of the Harlow club have been nights of work. Members also held a discussion on the merits of the two-stroke engine and the four-stroke. Secretary L. J. May says that during the debate it was hard to tell who was for and who was against each type.

I like to hear a group of model engineers having a good argument of this sort. It can reveal some very interesting facts.

Secretary: Mr L. J. May, 45 Sheering Road, Harlow, Middlesex.

CAMBRIDGE DATES

Mr M. J. Atkin, secretary of Cambridge and District MES, sent me the dates on which the club's track at Fulbrooke Road, Cambridge, will be open to the public. Clubs who would like to pay the Cambridge society a visit can arrange to come on dates not included in the list. Otherwise, says Mr Atkin, complications will arise, as the society must concentrate on public passenger hauling.

The dates are May 6 and 22, June 3, July 1, August 5 and 7, and September 2.

Will any clubs who would like to visit the Cambridge track, which is one of the finest in Britain, please contact Mr Atkin as soon as possible ? His address is 35 York Street, Cambridge and his telephone number Cambridge 57844.

CLUB DIARY

March 9 Rugby SMEC. Films by the P. & O. S.N. Co.

March 10 Thames Ship Lovers' and Ship Model Society. Lecture by Mr Bathe of the Science Museum on re-housing and re-setting the ship model collection.

March 11 SMEE. Lecture by Mr R. Hardy, motive power superintendent BR Stratford Depot, on " Railway Experiences " at 28 Wanless Road, London SE24 at 2.45 p.m.

March 11 York SME. Talk on crystals by Mr Hearfield at the Rechabite Buildings, Clifford Street, York at 7 p.m.

March 13 Clyde Shiplovers' and Model Makers' Society. A talk by Mr D. McDonald on Some Clyde Built Clippers at the Kelvingrove Museum and Art Galleries.

March 13 Historical Model Railway Society Impromptu meeting. Members are requested to bring models photographs, etc., for display and discussion.

March 13 Sutton Coldfield N. Birmingham MES. Work in progress at the Swan Inn, High Street, Erdington.

March 14 City of Leeds SMEE. Visit to Airdale Works to see Mr T. O. Hunts's Burrel traction engine.

March 15 Birmingham SME. Annual meeting at the White Swan Inn, Edmund Street at 7.30 p.m.

March 16 Bristol SMEE. Meeting at the Mary Room of the YWCA.

March 16 Romford MEC. Lecture on taps and dies by Mr J. Lane at the Red Triangle Club, Romford at 8 p.m.

March 16 Harrow and Wembley SME. Film night at Heathfield School, Harrow at 8 p.m.

March 17 Greenwich and District SMS. Talk by Mr A. E. Randall on painting ship models.

March 17 Welling and District MES. Meeting at the Welling Library at 8 p.m.

March 18 Malden SME. Annual Dinner at the headquarters, Claygates Lane, Thames Ditton.

March 18 SMEE. Rummage Sale at 28 Wanless Road SE24 at 2.45 p.m.

March 18 Thames Group Marine Modelling Society. Open night at the Reindeer Hotel, Wakefield Street, Gravesend at 7.45 p.m.

March 19 Railway Enthusiasts' Club. Rail tour of LSWR suburban area behind Adams 4-4-2T Radial. Relive the era before electrification. Tickets 25s. each from Mr A. P. Miall, " Hurstbourne," Wainsford Road, Everton, Lymington, Hants.

March 21 Northampton SME. Film show at the Kingsthorpe Community Centre at 8 p.m.

March 21 City of Leeds SMEE. Film show by Mr J. Hainsworth.

March 23 Rugby SMEC. Lecture by Mr Fenton of Alfred Herbert Ltd of Coventry.

March 24 Thames Shiplovers' and Ship Model Society. Film show by Mr David McGregor on the Sail Training Ship Race 1960 and the Thames Barge Race 1960. Meeting at Members' Coffee Room, Baltic Exchange, 24 St Mary Axe.

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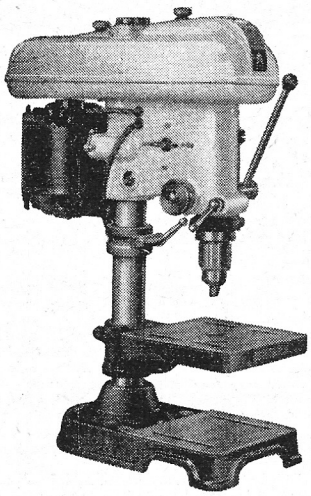

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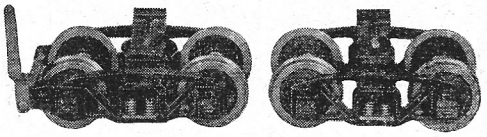

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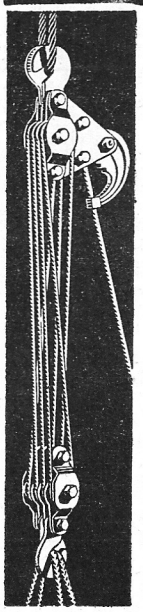

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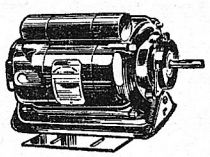
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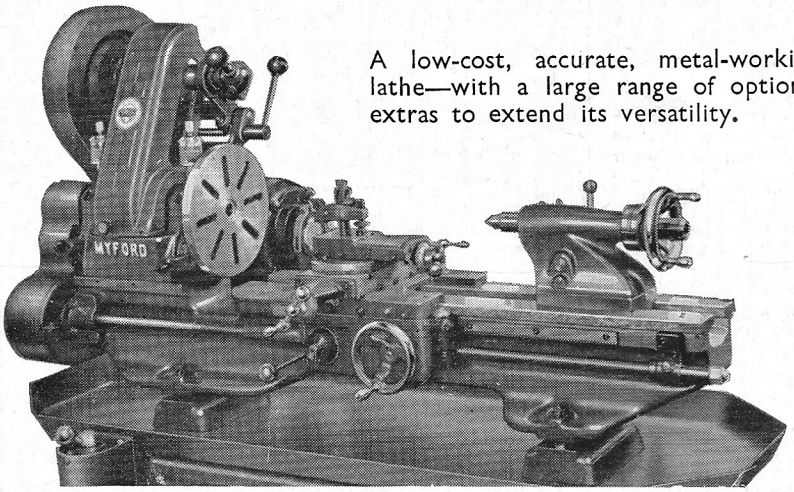

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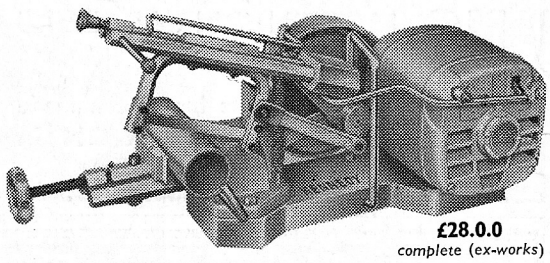

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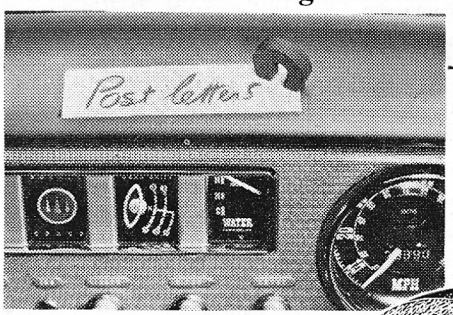

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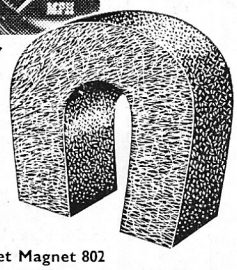

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